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Table of Contents, Page ii

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NOVEMBER, 1939

No. 752

The Blood Picture in Hog Cholera*

By H. C. H. KERNKAMP,† D.V.M.

St. Paul, Minn.

QUANTITATIVE changes in some of the cellular elements of the blood have been found to occur in a large percentage of swine affected with hog cholera. The largest and most significant change is a decrease in the number of white blood cells, or leucocytes. A shift in the relative proportion of lymphocytes and neutrophils, although less distinctive, occurred in a large percentage of the cases. It has also been observed that the sedimentation rate, or speed at which the blood cells settle, is very rapid in this disease.

The blood picture in hog cholera has been a subject of investigation by a number of workers. Dinwiddie¹ in 1914 called attention to a leucopenia as constituting the most obvious change in the blood picture of cholera-affected swine. He found approximately 7,000 fewer leucocytes per unit volume of blood in the cholera-sick than in the healthy swine. White cell counts as low

as 2,000 per cmm. are recorded. From a rather comprehensive study of the blood cells in hog cholera, Lewis and Shope^{2, 3} concluded that a rapidly progressive, severe leucopenia and a slowly progressive anemia of moderate degree are the changes characteristic of this disease. Cahill,⁴ Shu,⁵ Thorp and Graham,⁶ Oglesby, Hewitt, and Bergman,⁷ Cole,⁸ Sarnowicz,⁹ and Ishii, Watanabe and Ozarki¹⁰ describe a leucopenia as the most striking cell change in hog cholera. From the standpoint of a differential leucocyte count, Shu⁵ reports a neutrophilia with a shift toward young forms, whereas Ishii *et al*¹⁰ say that a neutropenia is more characteristic. The occurrence of a moderate anemia is cited by some.^{1, 2, 3, 5, 7}

PROCEDURE

The present investigation deals with studies of the blood in a relatively large number of swine. The animals included in the study were divided into three principal series: A series of artificially produced cases of hog cholera (series A), a series of hog-cholera cases in which the disease was

*Paper 1736 of the journal series of the Minnesota Agricultural Experiment Station. Read before the Section on Research at the 76th annual meeting of the A.V.M.A., Memphis, Tenn., August 28 to September 1, 1939.

†Division of veterinary medicine, Minnesota Agricultural Experiment Station.

contracted and developed under natural or field conditions (series B),* and a series comprising a group of pigs affected by diseases other than hog cholera (series C).

Fifty-five pigs comprised series A. All were healthy and vigorous before being subjected to hog-cholera virus and all proved susceptible to the infection. They were housed in clean, well lighted and ventilated pens throughout the period of sickness and were fed an adequate diet twice daily, morning and evening. The virus was injected into the muscles on the medial surface of the hind limb. Most of the animals were sacrificed when in a moribund state, and in only a few cases did the disease terminate by natural death. Lesions characteristic of those occurring in hog cholera¹¹ were found in every cadaver examined post mortem.

Sixty-seven pigs were included in series B. More than 65 per cent of the animals comprising this series represented advanced stages of hog cholera. All were sacrificed shortly after reaching the laboratory and, therefore, only a single examination could be made of their blood. Series C contained 27 cases of pneumonia and 49 cases in which there was an inflammation of one or more parts of the gastrointestinal tract. Hog cholera was not found in any of the pigs in this series. As in series B, the pigs included in series C were sacrificed shortly after being brought to the laboratory and a single examination of the blood was made.

RESULTS

The blood picture, as the term is used here, includes a determination of the amount of hemoglobin per 100 cc. of blood; a count of the numbers of erythrocytes and leucocytes per cmm. of the circulating blood; a differential leucocyte count; and, in many cases, the sedimentation rate of the cellular elements.

In series A, blood pictures were obtained on all of the pigs prior to the time of infection. The importance of this is obvious

where the objective is to study the changes that occur during the course of the disease.

Hemoglobin.—The values obtained for hemoglobin throughout the course of the disease were not significantly different from the values obtained on these pigs before they were exposed to the infection. Nine and nine-tenths Gm. of hemoglobin per 100 cc. of blood represents the average value for the pre-infection period. The range for the same period was 6.8 to 13 Gm. On the seventh day of the infection period the hemoglobin averaged 10.2 Gm. and the range 8.2 to 12.2. The average was never less than 9 nor more than 10.2 throughout the ten days covering the course of the disease. In general, it was observed that if the pigs had a comparatively low hemoglobin value during the pre-infection period, the value would continue to be low. Likewise, those with the higher values before they were infected usually maintained higher values throughout the disease period.

The hemoglobin of the pigs in series B averaged 8.3 Gm. per 100 cc. of blood. Each of two pigs in the series had slightly less than 3 Gm. per 100 cc. and red cell counts that were correspondingly low. Both were heavily infested with *Ascaris lumbricoides*, which, we believe, were responsible for the secondary anemia. Series C contained 27 cases in which the principal pathological process was an inflammation of the lungs. The hemoglobin of this group averaged 8.4 Gm. This series also contained 49 cases that presented an inflammatory syndrome of the gastrointestinal tract. An average of 9.3 Gm. of hemoglobin per 100 cc. was obtained for this group. These values are not very different from those obtained in the cholera-affected pigs included in the study.

The results show very definitely that a quantitative measurement of the hemoglobin of hog-cholera-infected swine is of no particular value as an aid to the clinical diagnosis of this disease.

Erythrocytes.—The erythrocytes, like the hemoglobin, did not vary significantly during the infection period from the number present in the pre-infection period. The

*For a more comprehensive description of the origin and nature of these cases, the reader should consult a previous paper by the author.¹¹

average number per cmm. on the 55 pigs before they were infected was 5,915,000 and the range 4,170,000 to 7,800,000. The average difference was never greater or less than 500,000 on any of the ten days marking the course of the disease. It was the usual thing to find that where the number of red cells was relatively low at the first examination, it continued to be low at all subsequent examinations.

The average red cell count on the 67 cases of hog cholera comprising series B was 5,416,000 per cmm. Nine had less than 4,500,000, of which seven were heavily infested with ascarids. In series C, involving 76 animals, the average was 5,920,000 erythrocytes per unit volume of blood.

Leucocytes.—The greatest differences between the pre-infection and post-infection values occurred in the total numbers of leucocytes per cmm. Decreases of 7,000 to 12,000 white blood cells per cmm. were frequently observed and, in some cases, the number present in the cholera-affected pigs was more than 17,000 less than the number counted before their exposure to the virus. In others, the decrease was less than 4,000.

The average number of leucocytes for the animals in series A in the pre-infection period was 14,200 per cmm. The range represented by the lowest and highest count during this period was 8,660 to 23,650. On the first day of the infection period the count averaged 10,700; on the second day, 7,400; third, 8,000; fourth, 6,700; fifth, 6,410; sixth, 5,280; seventh, 7,040; eighth, 5,250; ninth, 4,720, and tenth day, 7,300. The lowest count observed was 950, but counts between 1,500 and 3,000 were relatively common. The highest count was 38,400, and another was 32,400. The pig with 38,400 had an extensive inflammation of the tonsils and lungs, but no inflammatory reaction was noted in the other pig.

Series B, the cases of cholera developing in the field, had an average leucocyte count of 8,440. In eight the number per cmm. was greater than 12,000; in eight it was between 11,900 and 8,000; in 19 between 7,900 and 5,000; and in 32 it was less than 4,900. The highest counts, 62,660, 44,440, and 23,300, occurred in pigs heavily infested

with ascarids, but in another pig with an equally heavy ascarid infestation the number of leucocytes was 2,650. In all four cases portions of the small intestine were literally occluded by masses of ascarids. In 43 of the pigs in this series inflammatory processes of greater or lesser extent were observed in one or more of the following: Tonsils, pharynx, lungs, stomach, small intestine, large intestine, liver, kidneys, and lymph nodes. The average white cell count in this group was 7,170. Seventeen in the series did not present gross inflammatory lesions, and the average leucocyte count in these was 6,020.

The white cell count for the 27 cases of pneumonia in series C averaged 23,770 per cmm. and 29,000 for the 49 cases with gastrointestinal disease.

Differential Leucocyte Count.—The proportional relationship of the five different cell types (polymorphonuclears, eosinophils, basophils, lymphocytes, monocytes) expressed in percentiles comprise the differential leucocyte count.

The average differential count for the pigs in series A during the pre-infection or normal period was: Polymorphonuclears, 37.2; eosinophils, 2.8; basophils, 0.5; lymphocytes, 54.6; monocytes, 4. The count the first day after they were infected with hog-cholera virus did not show any significant change. On the second day after the virus was injected and on each day throughout the course of the disease, the polymorphonuclear and lymphocyte relationships were reversed. In general, the average daily polymorphonuclear value was 53.8 per cent and the lymphocyte, 41.7 per cent. The differential leucocyte count on the sixth day of the disease will illustrate the general trend on any day from the second to the tenth inclusive: Polymorphonuclears, 55.9; eosinophils, 0.6; basophils, 0.1; lymphocytes, 40; monocytes, 3.

In series B the average was: Polymorphonuclears, 44.8; eosinophils, 0.8; basophils, 0.3; lymphocytes, 49; monocytes, 4.4. For series C, containing the cases with inflammatory disease of the lungs and gastrointestinal tract and in which hog cholera did not exist, the count was: Polymor-

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phonuclears, 62.3; eosinophils, 0.3; basophils, 0.1; lymphocytes, 31.1; monocytes, 6

Sedimentation Rate.—The rate or speed of settling or sedimenting of the blood cells in anticoagulated blood plasma was determined on most of the pigs comprising series A. The simplicity of the test which was adopted in this study recommended its inclusion. The test consisted of placing 1 cc. of citrated whole blood in a Wintrobe hematocrit tube and then measuring the drop or fall of the cells in the column at certain definite intervals. One hour was the interval chosen.

The average sedimentation rate on 36 pigs in series A obtained prior to the time that they were infected was 0.04 cm. The range in these cases was 0.001 to 0.11 cm. The values obtained for each of the days during the period of disease show very definitely that the rate of sedimentation increases as the disease progresses. On the first day after the infection the rate was 0.098 cm., 0.113 on the second day, 0.202 on the third, 0.204 on the fourth, 0.316 on the fifth, 0.32 on the sixth, 0.303 on the seventh, and 0.417 on the eighth day.

Sedimentation rates were obtained on many of the pigs included in series B, and the average was 0.372 cm. In one case the fall in one hour was 0.78 cm.

DISCUSSION

The fact that certain measurable changes occur in the blood of hog-cholera-infected swine is clearly demonstrated in this study. A diminution of leucocytes equal to 24.6 per cent of the number counted prior to infection occurred on the first day after the virus was administered. For the group as a whole (series A) this was the first measurable change, since it occurred 24 to 48 hours before a febrile reaction was observed. Two days after the virus was introduced into the pigs the leucocytes had decreased to a number equal to 47.8 per cent of the pre-infection value, and on the sixth day the decrease equaled 62.8 per cent. The total number of leucocytes present for the days just mentioned was: First day, 10,700; second day, 7,400; and sixth

day, 5,280. The pre-infection count was 14,000.

While the daily progress of the leucopenia could be followed in the pigs in series A, only one examination was made on the cases included in series B and C. Nothing is known, therefore, with regard to the rate and magnitude of the decrease. Of the natural or field cases of hog cholera in series B, 76.1 per cent had leucocyte counts of 8,000 or less per cmm. and, in 47.7 per cent, the count was less than 5,000. Many of the animals in this series exhibited inflammatory processes of greater or lesser extent as a complicating factor, but still a very large proportion had a blood picture more typical of leucopenia. We agree with Lewis and Shope that a leucocyte count equal to 8,000 cells per cmm. or less in at least three sick pigs in the herd can be taken as sufficient evidence that a leucopenia exists and, hence, warrants a diagnosis of hog cholera. The value of the blood picture is greatest if the rate of decrease can be ascertained but, under practical field conditions, this has its limitations.

The pigs with inflammatory disease of the lungs and those representing an enteric inflammatory syndrome but in which there was no clinical and pathological evidence of hog cholera presented a very different blood picture from the standpoint of the leucocytes in particular. These cases were characterized by a leucocytosis and serve as a direct comparison between diseases marked by inflammation or in which inflammatory processes are not especially extensive. Other disease entities in swine have been studied, but sufficient material has not been collected that could be construed as having statistical significance that would warrant inclusion at this time.

The findings with regard to the total number of erythrocytes, significant variations in eosinophils, basophils, and monocytes, and of the quantity of hemoglobin in the circulating blood of hog-cholera-affected swine did not reveal that an evaluation of them would be of benefit or aid in its diagnosis. The sedimentation rate, although markedly increased in hog cholera over the rate in normal swine, nevertheless

has not been applied to a sufficient number of animals suffering from diseases other than hog cholera to justify a comparison. It is generally agreed that a rapid sedimentation rate occurs in acute infections and acute exacerbations of chronic infections, in severe intoxications, in many severe anemias, and in some endocrinopathies. Hog cholera belongs in the category of acute infectious diseases, and if the sedimentation rate proves to have a differential value in this disease, it will depend upon the magnitude as compared to other diseases. The average sedimentation rate on the sixth day of the disease was equal to 700 per cent over the average rate during the pre-infection period.

CONCLUSIONS

1. The blood picture in hog cholera is characteristic of a severe leucopenia.
2. Occurrence of a leucopenia in three or more pigs of a herd wherein swine are sick constitutes a most valuable aid to a diagnosis of hog cholera.
3. Leucocyte counts of 8,000 cells per cmm. or less are justifiable evidence indicative of a decrease below the normal.
4. No significant change in the numbers of erythrocytes or in the amounts of hemoglobin per unit volume of blood occurs in this disease.

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Discussion

FRANK THORP, JR.: Did you take the leucocyte counts at the same time each day?

DR. KERNKAMP: We took them at approximately the same time.

J. D. RAY: Have you observed the effects of other filtrable virus diseases, such as swine pox, on the leucocyte count?

DR. KERNKAMP: No, Dr. Ray, I have not.

DR. RAY: In cases having complications of other diseases, were the leucocyte counts high? Also, what kind of a conglomerate average did you get?

DR. KERNKAMP: I believe that I mentioned that in the paper, Doctor, especially in the group in series B that was brought in from the field. Some of them had complications of an inflammatory nature, more or less. I stated that even in view of some of these complications, the count was very low in a great many instances—sometimes not, of course. We had to strike the averages, since we could not pick out individual cases as we went along.

A. F. SCHALK: Dr. Kernkamp, concerning your second conclusion on the three pigs that are grouped as having leucopenia: Could you distinguish conditions such as enteritis, parasitism and swine erysipelas as distinct entities, not as complications, and would that conclusion stand up against those diseases?

DR. KERNKAMP: I would not include erysipelas, because I have not had the opportunity to examine any erysipelas cases, but I think the conclusion applies to enteritis and parasitism.

Brucellosis a Common Ailment

Undulant fever in the human being, now generally named brucellosis, is too often treated as ordinary arthritis, in the opinion of Harold J. Harris voiced before the American Congress of Physical Therapy at New York City in September. Dr. Harris estimated that 10 per cent of the rural population of the United States is infected with brucellosis due to the ingestion of raw milk and raw milk products.

Obviously, governors who veto appropriations for the control of this growing menace to public health are little aware of what they are doing independent of the effect of the disease on animal production.

Though the function of the tonsils is not known, these glands appear to aid growth. Young fish fed tonsil tissue of hogs grow larger than fish (controls) fed upon an ordinary diet.—I. S. Pohl, Berlin.

To be nutritious for live stock, feed must be relished.

Studies on Active and Passive Immunity Resulting from Inoculations of Formolized Inactivated and of Active Virus of Equine Encephalomyelitis*

By PETER K. OLITSKY, M.D., and ISABEL M. MORGAN, Ph.D.

New York, N. Y.

TO INVITE a clearer comprehension of the subject to be discussed, a brief review will be presented of work carried on during the past five years in this laboratory.†

The basis of the immunological studies on the virus of equine encephalomyelitis now to be described is that an immunity of high degree can be induced in guinea pigs and mice with formolized vaccines of the virus in which no active, infective agent could be demonstrated by tests made as rigid as possible. Thus, in one series of tests, such vaccines injected subcutaneously into guinea pigs in amounts of 1 cc. and repeated at a seven-day interval brought about resistance to the intracerebral inoculation of 1,000 to 10,000 cerebral lethal doses of virus when the interval between the last injection of virus and the immunity test was twelve to 92 days.¹ Similar resistance could be shown to be produced in the mouse, and the recent bulletins of the U. S. bureau of animal industry² indicate the effectiveness of such vaccines, prepared with infected horse brain (Shahan and Giltner³) or embryonated eggs (Beard, Eichhorn, Wyckoff and several others) in protecting horses on farms from attack by the epizootic disease.⁴

As ordinarily prepared, the vaccines were found¹ to be potent for immunization when there was a high content of virus in the tissues from which the vaccines were made. It was also determined¹ that this potency depended on the use of undiluted vaccine: When 1:10 and higher dilutions were em-

ployed, the immunizing power fell considerably—indeed, even to its extinction.*

The second point to emphasize is that the formolized vaccines, in rigorous tests, were shown to contain no detectable, active virus. These trials comprised the injection by various routes of mice and guinea pigs—animals with greatest susceptibility to the virus—with large amounts of vaccine (and in certain tests with amounts much greater than the total quantities used for effective immunization) without the development of any sign of infection. Neither was fever induced in the inoculated animals nor was virus found in the brain, even in serial passages, or in the viscera. Tissue cultures also were seeded with vaccines but no growth of virus could be obtained. Animal inoculation of fivefold concentrated vaccines and of vaccines diluted (to apply the principle of the well known "dilution phenomenon") also failed to reveal active virus. It is clear, therefore, that protection was produced by some means other than the minute amounts of virus (less than one infective dose) which may have been residual in the vaccines and, possibly, were not detected. But, it was established⁵ that the least amount of active virus required to induce a degree of resistance equivalent to that which follows vaccination with inactivated, formolized virus, namely, protection against 1,000 to 10,000 cerebral lethal doses, was between 3,000 and 30,000 mouse cerebral infective units.

*An interesting point in this connection is the elucidation of an earlier statement that of the same virus sample, part formolized immediately and part retained for 25 days in 50 per cent glycerol and then formolized, the formolized fresh portion proved antigenic; the formolized, glycerolated, nonantigenic.¹ In the light of later experiments by Olitsky and Harford (unpublished), such samples of glycerolated virus, which contains as high a virus content as do fresh brains, when used as formolized vaccines, bring about an equal degree of resistance.

*From the laboratories of The Rockefeller Institute for Medical Research. Presented at the Third International Congress for Microbiology, New York, N. Y., September 2-9, 1939.

†We take this means of expressing our debt to our former associates, Drs. Cox, Syverton, Harford, and Sabin, for their contributions.

A third point should be considered: In view of the recent interest in the reversibility of certain formolized viruses, is it possible that the virus here is slowly eluted or dissociated from the vaccine *in vivo* after its injection and, thus, that the immunity which develops depends, after all, on this active virus? There is no evidence for such an assumption. In fact, 1) blood and organs removed two to 14 days after inoculation of vaccine, and transferred to several hundred mice, revealed no virus. Moreover, the test for immunity was usually given on about the 12th day after the injection of vaccine. 2) As already stated, small amounts of active virus do not give rise to the degree of immunity accepted as standard. 3) If virus were dissociated from the vaccine *in vivo*, one injection of the latter should suffice for immunization; but this has been found to be insufficient. 4) Certain vaccines were prepared with 1 per cent formalin and others were kept for at least six months before use. That reversibility can occur under such conditions is improbable.

To conclude, then, active virus as such is not the immunizing factor, for in tissues containing virus inactivated by formalin, there is an amount of antigen sufficient, without the necessity of multiplication in the body, to produce immunity against 1,000 to 10,000 intracerebral lethal doses of virus.

It was observed⁶ that antiserum to active virus, injected into mice by the cerebral or nasal route, either before virus was given or mixed with virus, resulted in little protection (usually against ten to 100 cerebral lethal doses), or none at all. When, however, the antiserum-virus mixture was given intraperitoneally or intramuscularly to 12-15 day old mice, the protection was against high multiples of virus (usually against 10,000 to 100,000 and, sometimes, 1,000,000 to 10,000,000 minimal lethal peritoneal doses). Observations⁷ on guinea pig antiserum to formolized and to active virus indicated a difference in degree of protection by the intraperitoneal route, that is, although both antisera showed about the same low degree of neutralizing capacity by

the intracerebral test, by the intraperitoneal, antiserum to active virus revealed a high protective power and formolized virus serum a lower one, approaching that obtained by the intracerebral method. Furthermore, it was found that the antigenic capacity of both active and formolized virus could be blocked to the same extent by the action of an appropriate amount of antiviral serum.⁸

Various suggestions were offered to explain this phenomenon of difference in protective capacity of the immune sera dependent upon the route of injection, among them being one that there may be a qualitative distinction in the antibodies produced by active and inactivated virus. We now propose to offer evidence to show that the difference should be considered solely as a quantitative one. In an attempt at elucidation of the problem, it was approached from three different directions: First, by means of a study of the titre of neutralizing antibodies in the rabbit, immunized by means of formolized vaccine as compared with that produced by active virus; second, by dilution of immune sera; and, third, by increasing the number of courses of vaccination in the guinea pig. In all these procedures the eastern strain of equine encephalomyelitis virus was employed.

IMMUNITY REACTION IN THE RABBIT

Antiserum was produced in rabbits by three subcutaneous injections of 5 cc. each at seven-day intervals of formolized, infected mouse-brain suspensions. The serum so produced protected 12- to 15-day-old mice by the intraperitoneal route against 1,000,000 to 10,000,000 mouse peritoneal lethal doses of virus. The serum collected from rabbits receiving a second, similar course of formolized vaccine injections was protective again to the same titre. Hence, the rabbit forms antibodies to a degree equal (as measured by the intraperitoneal method in young mice) to the maximal protective capacity of antiserum that is developed after immunization with active virus.

DILUTION TESTS WITH IMMUNE RABBIT SERUM

A further corroboration of quantitative rather than qualitative difference between antisera to active and to formolized inactivated virus was brought out by dilution tests with immune sera.

Thus, a potent antiserum can be diluted to a certain extent and retain its neutralizing capacity in protection tests made by inoculation of serum-virus mixtures by intraperitoneal, intranasal and intracerebral routes. By the use of intracerebral inoculation and of diluted and undiluted immune serum, results were obtained sup-

difference exhibited on dilution is not apparent by the usual intracerebral method of testing, for, then, undiluted active virus antiserum protects no better than the same serum diluted, or than the undiluted formolized virus antiserum. The more effective sera may then be considered as containing a "reserve" of antibody, that is, an excess which is not demonstrable by the use of undiluted serum, and this factor of "reserve," as brought to light by dilution, is another point in the elucidation of the quantitative rather than the qualitative distinction between the two types of antisera.

Intraperitoneal mouse protection test with serum of guinea pigs immunized with formalized Eastern equine encephalomyelitis virus

	Final dilution of active virus	No. of courses of immunization		
		1	2	3
Immune sera	10^{-1}	██████	██████	██████
	10^{-2}	██████	██████	██████
	10^{-3}	██████	██████	██████
	10^{-4}	██████	██████	██████
	10^{-5}	██████	██████	██████
	10^{-6}	██████	██████	██████
Normal serum	10^{-6}	██████	██████	██████
	10^{-7}	██████	██████	██████
	10^{-8}	██████	██████	██████
	10^{-9}	██████	██████	██████

■-1 mouse died □-1 mouse survived

porting the quantitative differences in antibody content of the two types of antisera.

To illustrate, a serum prepared by injection of active virus, which shows a moderate degree of protection by the mouse intracerebral test and a high value by the intraperitoneal route, can be diluted 1:100 and still neutralize the same number of mouse cerebral doses when injected intracerebrally. On the other hand, a serum prepared by injection of a single course of formolized vaccine, which shows moderate protection both by intracerebral and intraperitoneal routes, can not be diluted and still retain its original potency, as revealed by intracerebral inoculation. It should be emphasized, however, that this

INCREASE OF NUMBER OF COURSES OF VACCINATION IN THE GUINEA PIG

Earlier work on the production of humoral antiviral bodies had been carried out in guinea pigs. It should be recalled that, in this animal, formolized virus evoked the same low degree of neutralizing capacity by the intracerebral method as by the intraperitoneal, thus exhibiting a difference in effect from that of active virus as antigen which later gives rise to serum having a high capacity for intraperitoneal protection. It was desirable to restudy the immunization of guinea pigs by increasing the number of courses of inoculations.

Accordingly, a group of guinea pigs was injected with formolized, infected mouse-brain suspension. The first course of inoculations comprised three subcutaneous doses of 1 cc. each at two-day intervals. Serum was collected ten days after the last injection and a similar course of vaccination repeated. The animals were bled after the second and again after a third similar course. By the intraperitoneal test in 15-day-old mice, the serum obtained after the first course showed protection against only ten mouse peritoneal lethal doses; after the second, against 1,000 to 10,000; and after the third, against 10,000 to 100,000 doses. It will be observed from a study of the chart that there is a sharp distinction between the neutralizing effect of the serum obtained after the first course and that after the second—the latter matching

to a fair degree the neutralizing capacity of the serum collected after the third and final course of inoculations. It is thus clear that by increasing the number of courses of inoculations of formolized virus, the guinea pig then develops in its serum antiviral substance of power equal to that brought about by injections of active virus.

CONCLUSION

What can be concluded from these experiments is that a formolized vaccine of equine encephalomyelitis virus—inducing a resistance that is not brought about by any active virus which may be contained in the vaccine—is capable of reproducing the antigenicity of active virus, as shown by the results of active immunization and of passive protection.

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New Treatment of Epizootic Lymphangitis

Although the farcy-like blastomycosis of horses known as epizootic lymphangitis does not exist in the continental United States, it is well known to the veterinary service of our insular possessions. During the World War the name was found in lists of animal diseases of all of the armies on the Western Front. During the Philippine Rebellion at the beginning of this century, it gave the army veterinarians constant trouble, particularly in regard to its dif-

ferentiation from cutaneous glanders. The horses thought to have clinical glanders—but, in reality, victims of epizootic lymphangitis—that did not react to mallein gave the mallein test a bad reputation among commanders of our expeditionary force in the Philippines. These same officers in France, then risen to higher ranks, argued against the reliability of mallein in detecting glanders on the ground of their observations in the Philippine campaigns.

Epizootic lymphangitis belongs to the long list of animal diseases which our bureau of animal industry has kept from invading our country. On account of the prompt action taken following the cessation of hostilities in 1918, not a case appeared in this country.

The article entitled "Remarque sur un Nouveau Traitement de la Lymphangite Epizootique," just published, is therefore of considerable interest at this moment.

The author, confirming previous observations of others, reports that intravenous injections of bismuth iodide and potassium iodide in series of eight daily doses brings about a prompt cicatrization of the ulcers. After a week of rest a second series was administered to complete the healing of the already disappearing lesions. The dose required consists of: Bismuth iodide, 1 Gm. (15 gr.), and potassium iodide, 6 Gm. (1½ dr.) in 100 cc. (3 oz.) of water. The ulcers were treated locally with methylene blue. Animals so treated are kept under observation for a long period of time to detect recurrences early.

The diagnosis of the cases reported was confirmed by microscopic examination of the pus contained in the pustules. Although the cases upon which this treatment was used were not numerous, the striking results appear to leave no doubt as to its value. (*Tierno N'Dao, vétérinaire auxiliaire principal, Kaolack. Bulletin des Services Zootechniques et des Epizooties. Occidental French Africa, ii, July, 1939, pp. 21-22.*)

Because of their low nutritive ratio, the brans of cereal grains should be classified as a roughage.

Experimental Transmission of Equine Influenza*

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DURING the months of March and April, 1939, there was reported a number of outbreaks of a disease of horses which in instances assumed a virulent form. The typical clinical symptoms of equine influenza were consistently observed but the course of the disease apparently varied with the form of secondary complications. In conformity with the known characteristics of equine influenza outbreaks, the most unfavorable outcomes occurred in those in which the animals had been in transit and quartered in sales stables while being transported to their final destination.

A report of an investigation of an outbreak in a sales stable in Massachusetts showed that of 28 horses brought from New York City on April 8, 1939, one died. This group had previously been shipped from some middle western state and kept for a short time in Pennsylvania. Of a shipment of 76 horses which came from Illinois on April 9, 18 died. Of 28 horses imported from Canada on April 9, seven died.

The usual symptoms of depression, pyrexia, anorexia, together with edema of the limbs, were noted. A number of animals showed respiratory disturbances and after the appearance of symptoms some died within 48 to 72 hours. Other animals continued to eat throughout the entire period of illness and showed no symptoms of respiratory involvement.

On April 27, Dr. E. M. Aldrich, a representative of the U. S. bureau of animal industry, forwarded to the laboratory samples of blood taken from three affected horses.

The blood samples were in good physical condition when received, the serum being clear and there was no gross evidence of hemolysis. Cultures of the serum were made and the samples were stored in the refrigerator. Examination of the cultures

on the following day revealed considerable bacterial contamination. After centrifugation the serums were pooled and passed through a Berkefeld N filter candle.

On May 2, each of two normal adult horses was inoculated subcutaneously with 6 cc. of the bacteriologically sterile filtered serum. After an incubation period of four days, one horse showed a febrile reaction which continued for about a week before returning to normal. Accompanying the febrile reaction were increased pulse and respiration rates, nasal discharge, edema of the hind legs and rather pronounced icterus. The animal was off feed on the third day of the febrile period but gradually regained appetite and ate normally three days later. The duration of the illness was a little over one week, the edema of the legs being the last symptom to disappear. The incubation period in the second horse was five days, and the course and symptoms were essentially the same as in the first horse.

A normal adult horse was placed in contact with the above animals on May 8, which was about the time that their febrile reactions were most pronounced. The contact horse developed a febrile reaction on the sixth day. The pulse and respiration rates increased and there was some nasal discharge, icterus, and swelling in the pharyngeal region. No swelling or stiffness of the hind legs occurred. Although there was some loss of appetite during the reaction period, which continued for about eight days, at no time was the animal completely off feed.

Samples of blood were collected from each of the two horses inoculated with the filtered serum on the seventh, eighth, thirteenth and sixteenth day after the injections had been made. Samples of blood were also obtained from the contact horse on the first, second, seventh and tenth day after contact exposure to the two princi-

*From the pathological division, Bureau of Animal Industry, U. S. Department of Agriculture.

pals. Hematocrit readings for sedimentation rate and volume of red blood cells are recorded in table I.

TABLE I—Sedimentation rate and volume of red blood cells of experimental horses.

HORSE IDEN- TIFICA- TION	DATE	RATE (HRS.)				VOL- UME R.B.C.
		¼	½	1	24	
First	5-9	53.5	60	62	64	32
	5-10	61	63	64	66	30
	5-15	8	49	52	55	39
	5-18	30	52	55	58	38
Second	5-9	38	46	50.5	54	38.5
	5-10	57	60	62	64	32
	5-15	15	49	53	56	39
	5-18	3	41	50	54	41
Con- tact	5-9	3	30	43	49	45
	5-10	5	11	22	41	47
	5-15	18	53	55	58	37
	5-18	53	61	63	65	32

A comprehensive report of equine influenza as it occurred under wartime conditions was presented at the Thirteenth International Veterinary Congress by Todd and Soutar.¹ In their report they cite the results of the injection of 5 cc. of virulent blood into each of 700 healthy, susceptible horses under favorable conditions as a criterion with which to compare the disease in its uncomplicated state. The results of this undertaking are probably comparable with those to be expected from the injection of filtered serum from virulent blood, and are annotated herewith:

Pyrexia, 25%.

Pyrexia and anorexia, 40%.

Pyrexia, anorexia, and edematous swelling of the limbs, 16%.

Pyrexia, anorexia, and edematous swelling of the limbs and eyes, 6%.

Pyrexia and edematous swelling of the limbs, 5%.

Pyrexia and edematous swelling of the eyes, 5%.

All the above mentioned symptoms with cough or diarrhea in addition, 3%.

Since the incubation period, symptoms, and course of the disease induced by the bacteria-free serum are quite typical of uncomplicated equine influenza, it is concluded that the samples of blood submitted contained the virus of equine influenza.

Reference

¹Todd, A. G., Soutar, J. J. M.: Proc. 13th Int. Vet. Cong., ii (1938), p. 1202.

Hemoprevention in Foot-and-Mouth Disease

Hemoprevention is a name commonly used for the new prophylactic treatment of foot-and-mouth disease. It consists of large injections of blood plasma prepared from the whole blood of selected animals that have just recovered from an attack of the disease. Cows or bulls that have shown symptoms for 12 days and less than 20 days are chosen. Animals that have shown pyogenic or gangrenous complications are rejected as donors.

The blood is drawn from the jugular into graduated 5-liter flasks containing 120 cc. (4 oz.) of a 20 per cent solution of sodium citrate. Four liters (8 pts.) per animal is the amount usually drawn at one bleeding. The operator can make six to seven bleedings per hour, or about 45 per day.

The blood is taken to the laboratory, where it is tested for contamination, titration with guinea pigs, and subsequent preparation. It is kept in the dark at uniform cellar temperature, and agitated every three or four days to insure even distribution of the special antiseptic employed. Fifteen days later, the blood is decanted, all mixed together in large flasks, and then divided into 2-liter bottles in such a way as to insure that each bottle contains blood of at least ten cows from two different herds.

The final step consists of running the blood through a Laval cream separator of modified mechanism. The blood cells flow out through one of the spouts and the plasma through the other. The plasma is the finished product. The dose required is 2 cc. per Kg. (2.2 lbs.) of body weight for adults and 3 cc. per Kg. for calves. (*Chrétien and Thiéry, Bulletin de l'Académie Vétérinaire, xii, Jan. 1939 pp. 48-59.*)

The American bison, or buffalo, was one of the best natural engineers ever known. It was such a good surveyor that humans seeking a way for railroad lines to cross the plains followed the old buffalo trails for many miles—without being able to improve the grade.—*Hunting & Fishing.*

Studies on the Possible Rôle of Endoparasites in the Transmission of Infectious Anemia*

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INFECTIOUS anemia, or swamp fever, is a specific infectious disease of Equidae due to a filtrable virus.† This disease has a wide geographical distribution, having been recognized in various parts of Europe, South Africa, Japan, Canada, and the United States. Generally speaking, it is most prevalent in poorly drained, low-lying sections. Active cases occur principally during the summer months; chronic cases may be seen at all seasons of the year; and it is possible to produce the disease experimentally at any time.

Infectious anemia can be readily transmitted experimentally to normal Equidae by the subcutaneous inoculation of filtered or unfiltered blood serum, whole blood, or emulsions of tissue, from infected animals. While experimental evidence has been reported to indicate that transmission may occur either by way of the intestinal tract or by means of biting insects, the transmission of the infection by feeding contaminated material, by contact, or by insect vectors has been found more or less difficult.

Many investigators have suspected that endoparasites may play a part in the transmission of infectious anemia, but this hypothesis has been tested only to a limited extent. Reis,¹ in 1906, first suggested that *Gastrophilus* larvae may be connected in some way with infectious anemia, and the Seyderhelms,² in 1914, also ad-

vanced the theory that bots were the cause of the disease. While subsequent investigations by Favero,³ Van Es and Schalk,⁴ Scott,⁵ Flocken,⁶ and others failed to show any casual relationship between *Gastrophilus* larvae and infectious anemia, Luhrs⁶ reported transmission of the disease by subcutaneous injection of an extract of *Gastrophilus* larvae. Luhrs⁶ also reported transmission of the disease by injection of a suspension of eggs and embryos of *Filaria equina* (*Setaria equina*) removed from washed females from the body cavity of an infected horse. He believed that all endoparasites which take up the body fluids of infected horses may be carriers of the virus.

Hadwen,⁷ who reported investigations in which Ransom, a Bureau investigator, co-operated, stated that feeding to normal horses infective larvae of parasites from cultures of feces of infectious anemia horses failed to produce the disease. Injections of juices or extracts of worms taken from horses suffering from the disease likewise gave negative results. He stated that the case of one horse was a possible exception. This animal showed the first symptoms of infectious anemia five months after inoculation but, owing to opportunity for extraneous infection in this period, Hadwen did not attach much importance to this result. He also noted that horses injected with juices of fresh worms or extracts of dried worms or bots showed on postmortem examination heart lesions very similar to those observed in infectious anemia horses.

What the common mode of transmission of infectious anemia may be in nature, therefore, remains questionable.

In those localities in the United States

*This investigation was a cooperative project of the zoological and pathological divisions of the Bureau of Animal Industry, U. S. Department of Agriculture. The collection of parasites and preparation of parasite extracts and other material were carried out by J. T. Lucker of the zoological division. The injections, observations, autopsies and other experimental work on infected and test horses were carried out by C. D. Stein, O. L. Osteen and W. S. Gochenour (resigned Nov. 1938) of the pathological division.

†A description of infectious anemia and other information relating to this disease are given in U.S.D.A. Farmers' Bul. 1819.

*Unpublished results of experiments performed by Flocken in the pathological division, Bureau of Animal Industry, U. S. Department of Agriculture.

where infectious anemia appears to be enzootic, it has been repeatedly observed that a large percentage of the infected animals show a heavy infestation with bots and intestinal worms, particularly *Strongylus* sp. and cylicostomes. Since the virus is apparently present in the blood of infected animals at all times, certain of these parasites, because of their habits, have an excellent opportunity to acquire the infection. Moreover, the findings of Luhrs⁶ and the possibility that the disease may have been transmitted to one animal by inoculations of extracts of helminths in the experiments reported by Hadwen⁷ also indicate the desirability of further investigation of the theory that endoparasites may play a part in the dissemination of virus. The experiments reported in this paper were therefore performed.

MATERIALS AND METHODS

The infected horses from which the parasites used in these experiments were collected, or from which feces were obtained for the preparation of cultures, were experimentally induced cases of infectious anemia.

The test horses used were normal animals that had been held under observation at the Animal Disease Station, National Agricultural Research Center, Beltsville, Md., for a considerable time previous to the commencement of each experiment. These animals were housed in separate, screened barns. Temperatures of all test horses were taken and observed twice daily during the entire period of each experiment.

Equipment from the zoological division laboratory, located about one mile from the Animal Disease Station, was used for all operations involved in the collection and subsequent treatment of parasites or feces from infected animals, and all steps in the treatment were carried out in this laboratory. No work on infectious anemia had been done previously in this laboratory and no infected animals were kept in its immediate vicinity.

Many of the adult *Strongylus* sp. and cylicostomes used for the preparation of the extracts employed in experiment 1 were col-

lected during the course of a postmortem examination conducted at the Animal Disease Station; they were placed in bottles containing physiological saline. These worms and part of the intestine of the infected horse were then removed to the laboratory of the zoological division. More worms were collected during the ensuing 24 hours, the intestines and worms collected on the first day being kept in a refrigerator overnight. Bots use for preparing the extract employed in experiment 3 were collected in a similar manner from the stomach of another horse. They also were kept overnight in a refrigerator before steps in the preparation of the extract were begun.

Much of the debris adhering to the parasites was removed by preliminary rinsings in saline. Parasites of each of the three groups mentioned were separately placed in a bottle containing saline and corked. The bottles were shaken for about two minutes and the salt solution decanted, or the parasites were removed with forceps to a clean bottle of saline. After this process had been repeated two or more times, sterilized salt solution was used for two or three additional similar washings. The parasites were then transferred to a sterilized bottle and washed at least twice in sterile saline solution. In all subsequent steps in the preparation of each extract, only sterilized solution and sterilized apparatus were used.

The washed parasites and, as a rule, a few cubic centimeters of saline not removed by the final decantation were transferred to a mortar. The parasites were broken up, or cut up with scissors, and thoroughly triturated for about 15 minutes, some saline being added during the process. The suspension of triturated tissue was rinsed with saline into a tube which was corked, shaken once or twice, and placed in a refrigerator. The manner in which the respective extracts were obtained in a form suitable for injection is given in connection with the experiment in which each was used.

Third-stage horse strongyle larvae used for the preparation of an extract employed in experiment 2, or administered orally in

this experiment, were isolated from fecal cultures by means of the Baermann apparatus. The cultures had been kept for five to 36 days in the laboratory or in a screened porch (mean temperature about 26° C.). The larvae from a given series of cultures were obtained in a small volume of water. All of the larvae used for the preparation of the extract, and most of those used for feedings, were then subjected to a second passage through a Baermann apparatus. Following concentration in a small volume of water, the larvae were counted by a dilution method. Larvae of *Strongylus vulgaris*, *S. equinus*, and cylicostomes were differentially counted. All larvae were washed several times in water. Each time they were suspended and shaken, centrifugation was necessary before the supernatant liquid could be rejected.

Following these preliminary washings, the larvae were transferred to sterilized apparatus. Those used for the feeding experiments were then washed several times more in sterilized distilled water and were finally transferred to a gelatin capsule. Those used in preparation of the extract were subjected to final washings in sterilized saline and were then transferred to a mortar containing fine sand. The larvae and moistened sand were ground together vigorously for about 30 minutes. Examination showed that practically all of the larvae were ruptured or broken up by this treatment. The contents of the mortar were transferred to a tube and thoroughly shaken twice before being placed in the refrigerator. The manner in which the extract was obtained in a form suitable for injection is given in connection with experiment 3.

EXPERIMENTAL DATA

Experiment 1.—Following overnight storage in the refrigerator, the macerated tissue of about 50 specimens of washed *Strongylus* in the suspension prepared as previously described had settled to the bottom of the tube and the more or less clear supernatant fluid or extract was pipetted off, placed in a clean sterilized tube and stored in the refrigerator until the extract

was used. Horse 1 was injected subcutaneously with 10 cc. of this extract. On the 14th day following injection, horse 1 developed the usual initial febrile reaction followed by typical symptoms of acute infectious anemia, such as congestion and icterus of the conjunctiva, depression, inappetence, weakness and loss of flesh. The disease ran an acute course, terminating in death on the 35th day following injection of the extract. The temperature reached a maximum of 106.2° F. The temperature reaction is shown in figure 1. The autopsy and histological examination revealed pathological alterations characteristic of the acute form of the disease.

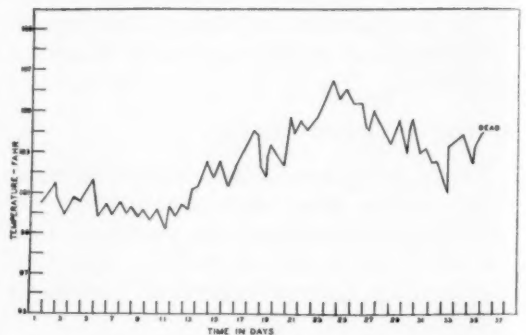


Fig. 1. Temperature reaction of horse 1 following injection of washed *Strongylus* extract.

Horse 2 was injected subcutaneously with 10 cc. of the extract of about 400 cylicostomes. This extract consisted of the supernatant fluid removed when, following overnight storage in the refrigerator, the worm tissue had settled from the suspension prepared as previously described. The extract was kept in the refrigerator until used.

Horse 2 showed no symptoms of infectious anemia in 36 days after the extract was injected. A blood sample from this horse was injected into a normal horse and failed to produce any reaction in a period of 134 days; the latter horse was subsequently injected with known infectious anemia virus and developed the disease in 13 days.

Horse 3 was injected subcutaneously with 25 cc. of the saline in which the *Strongylus* sp. and cylicostomes had been

washed the final time before they were ground up. The last washings from the two kinds of worms were kept separately in the refrigerator overnight and were then combined and replaced in the refrigerator until used.

Horse 3 showed no symptoms of infectious anemia within 36 days after the washings were injected. Subsequent inoculation of blood from this horse into a normal horse failed to produce the disease in 134 days; the latter horse was injected with known infectious anemia virus and it developed the disease in eight days.

The results of experiment 1 indicate that worms of the genus *Strongylus* collected from a horse affected with infectious anemia contained the virus within their bodies, while cylicostomes from the same infected animal did not. The fact that injection of the combined last washings from both kinds of worms gave a negative result indicates that the exterior surfaces of the *Strongylus* worms had been washed free from virus before the worms were ground up. Whether the virus was actually present in the body fluids or tissues of the *Strongylus* worms or merely in ingesta within the lumen of their digestive tracts is not evident from the experimental data.

Experiment 2.—Since experiment 1 had shown that *Strongylus* sp. may carry the virus within their bodies, it seemed possible that the virus might be capable of entering the eggs of these worms and, hence, might be present in third-stage larvae of these parasites.

To test this possibility, horse 4 was subcutaneously injected with 10 cc. of an extract of 2,451,000 washed third-stage strongyle larvae (about 69,000 *Strongylus* and 2,382,000 cylicostome larvae). After overnight storage in the refrigerator, the sand and macerated larvae in the suspension, prepared as previously described, had settled to the bottom of the tube and the supernatant fluid was removed and filtered through a Seitz EK filter. This extract was kept in the refrigerator until used.

Horse 4 showed no symptoms of infectious anemia within five months after the extract was injected. Blood samples from

this horse, when injected into a normal horse, failed to produce the disease in a period of four months.

Horse 5 was subcutaneously injected with 10 cc. of the saline in which the larvae used to prepare the extract were washed the final time. When the larvae had been centrifuged down the final time, the tube was allowed to stand for one hour before the saline was removed and placed in the refrigerator. It was filtered through No. 1 Whatman paper the next day and kept in the refrigerator until used.

Horse 5 showed no symptoms of infectious anemia within five months after these washings were injected. Blood from horse 5, when injected into a normal horse, failed to produce the disease in four months.

Horse 6 received three lots of washed third-stage strongyle larvae. Capsules containing the larvae were administered with a balling gun. The initial dose consisted of about 32,000 larvae of *Strongylus* and 295,000 larvae of cylicostomes. A second dose, consisting of 12,000 larvae of *Strongylus* and 94,500 larvae of cylicostomes, was given 27 days later, and a third dose, consisting of 11,000 larvae of *Strongylus* and 249,000 larvae of cylicostomes, was administered 15 days after the second. The process of isolating and washing the larvae of each lot usually required about 48 hours. Some of the larvae, however, were not in contact with water more than 24 hours. Free-living nematodes present in the fecal cultures were not entirely eliminated.

Horse 6 showed no symptoms of infectious anemia within 160 days after the final dose of larvae. Blood from this horse, when injected into a normal horse, failed to produce symptoms of the disease in 120 days.

In experiment 2, third-stage strongyle larvae developing in feces from horses affected with infectious anemia did not produce the disease when administered to a normal horse. Injection of an extract of such larvae, including a fairly large number identified as belonging to the genus *Strongylus*, also failed to produce the disease in a normal horse.

Experiment 3.—Horse 7 was injected subcutaneously with 7 cc. of an extract of twelve bots (ten *Gastrophilus intestinalis*; two *G. nasalis*) collected at autopsy from the stomach of a horse that died with acute infectious anemia. Since, after overnight storage in the refrigerator, the macerated bot tissue in the suspension, prepared as previously described, had not settled, the suspension was filtered through No. 1 Whatman paper. This filtrate, or extract, was noted to be still cloudy after it had been kept for 30 hours in the refrigerator. It was filtered again in the same manner and kept in the refrigerator until used.

Horse 7 showed no symptoms of infectious anemia within nine months after the extract was injected. An injection of blood from this horse into a normal horse failed to produce the disease in four months.

Horse 8 was injected subcutaneously with 10 cc. of the saline in which the bots were washed the final time. After filtration through No. 1 Whatman paper, the saline was kept in the refrigerator until used.

Horse 8 showed no symptoms of infectious anemia within nine months after injection of the washings. Injection of blood from this horse into a normal horse failed to produce the disease in four months.

Experiment 3 indicated that the virus of infectious anemia was not present in the bodies of bots harbored by a horse affected with this disease.

DISCUSSION

The first definite evidence that worms of the genus *Strongylus* harbored by a horse affected with infectious anemia contained the virus of this disease within their bodies is presented in this paper. The data of the experiment in which this result was obtained do not indicate whether the virus occurred in the tissues of the worms or in ingesta in their digestive tracts. Administrations of washed third-stage larvae of *Strongylus* and cylicostomes obtained from the feces of infected horses failed to produce the disease in a normal horse. Hadwen⁸ also reported failure to produce the disease by the administration of larvae.

The negative results suggest that these larvae are not a factor in the transmission of the disease. However, it must be granted that the larvae fed in the experiment carried out by the writers were subjected to rather drastic treatment in an effort to insure the absence of virus from their external surfaces, which may have interfered with their ability to pursue normal development. Moreover, evidence that these larvae actually entered and parasitized the tissues of the test animal is lacking. The writers also failed to demonstrate, in a single experiment, the presence of the virus in third-stage larvae of *Strongylus* and cylicostomes from the feces of infected horses by injecting an extract of the washed larvae into a normal horse. The desirability of further investigation as to the possible rôle of horse strongyles in the transmission of this disease is obvious. As far as the presence of virus in bots harbored by infected horses is concerned, the only positive report is that of Luhrs.⁶

SUMMARY AND CONCLUSIONS

In a series of experiments involving some of the common parasites of Equidae (horses, mules, and asses), it was determined that worms of the genus *Strongylus*, collected from a horse affected with infectious anemia, contained the virus of this disease within their bodies, and the disease was transmitted to a normal horse through injection of a saline extract of the washed, macerated bodies of these worms. Whether the virus was present in the tissues and body fluids of the worms, or in the ingesta within the lumen of the intestinal tract of the worms, was not determined.

Injection of a similar extract of washed cylicostomes (small strongyles) collected from the same infected horse did not produce the disease in a normal horse.

That the virus was completely absent from the external surfaces of the strongylus worms when they were ground was indicated by the fact that a horse injected with the combined last saline washings from these worms and the cylicostomes did not acquire the disease. A normal horse in-

jected with a similar extract of washed bots (*Gastrophilus intestinalis* and *G. nasalis*) collected from another infected horse also failed to become infected, indicating that these bots did not contain the virus of infectious anemia.

A horse repeatedly fed large numbers of washed third-stage larvae of *Strongylus* and cylicostomes obtained from the feces of horses having infectious anemia did not become infected with the disease. A normal horse injected with a saline extract of large numbers of such third-stage larvae also did not become infected.

These facts suggest that third-stage larvae developing from the eggs of *Strongylus* and cylicostomes harbored by infected horses do not contain the virus, but the evidence of these experiments is not regarded as an adequate basis for denial of the possibility that the larvae of these nematodes, *Strongylus* in particular, may transmit infectious anemia.

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- ⁸Hadwen, S.: Notes on swamp fever. Jour. A.V.M.A., lvi (1920), n. s. 9 (5), pp. 439-443.

American-Like Equine Encephalomyelitis Identified in India

In India, cases of a disease in horses characterized by symptoms of paraplegia were, until recently, either diagnosed as Kumri (= an equine disease local to India and surrounding countries which is identified by incoördination of movement and loss of control over the hind limbs) or attributed

to a variety of unproved etiological factors. Prior to the winter of 1933, no evidence was available that the specific form of equine encephalomyelitis, such as exists in America, Argentine and elsewhere, also occurs in India.

The first outbreak in India of encephalomyelitis in which a virus was suspected to be the cause occurred in a cavalry regiment at Multan, Punjab, in the winter of 1933. The disease was investigated and evidence adduced adequate to show that it was very closely related to the American type of equine encephalomyelitis and that it was probably caused by a neurotropic filtrable virus of organotropic type. Since that time, several outbreaks of an apparently similar nature have been reported but the rôle of a virus as the causative factor in these outbreaks has not been definitely established. (Lakshmi Sahai. *An Outbreak of Equine Encephalomyelitis in a Mounted Military Police Troop in Bihar. The Indian Journal of Veterinary Science and Animal Husbandry*, viii, December, 1938, pp. 341-351.)

Serum Sickness Prevention*

If children given antidiphtheritic (horse) serum are treated with convalescent serum within 24 hours, serum shock is prevented, and if the convalescent serum is given three to four days after the antidiphtheritic serum, an erythema of but short duration is produced. When the administration is delayed until the eighth day, the convalescent-serum injection produces an anaphylactic reaction of shock-like intensity. Children thus treated are desensitized to horse serum. The conclusion drawn from these observations is that convalescent serum given within three days following antidiphtheritic serum prevents serum shock.

Whether any homologous convalescent serum would prevent serum shock in animals would be interesting information.

*Voss, A. E. and Hundt, O.: Zeitschrift für Immunitätsforsch., xciv, November, 1938, cited editorially by Journal of the American Medical Association, cxli, April 1, 1939.

Toxic Algae in Colorado*

By A. W. DEEM, D.V.M., M.Sc., and FRANK THORP, JR., D.V.M., M.Sc., Ph.D.

Fort Collins, Colo.

CERTAIN SPECIES of blue-green algae, on the basis of field evidence, have been suspected for many years of being toxic to live stock. Fitch *et al.*,¹ in reporting their investigations of algae poisoning in Minnesota (1934), gave an excellent review of the literature on the subject up to that time.

Fitch and his coworkers found that the poisoning occurred at certain times when the algae were concentrated by the wind at one end of a lake. They reported losses in cattle, sheep, hogs, chickens, turkeys, ducks,



Fig. 1. Heavy scum of algae on the surface of the water in the shallow arm of the lake.

and geese and, experimentally, found the algae toxic to rabbits, guinea pigs, and pigeons. The experimental animals died suddenly when the material was fed or inoculated intraperitoneally. No gross lesions were produced. It was found that the algae deteriorated rapidly and the toxicity was lost upon putrefaction but, when the algae were fresh, the toxic principle was relatively heat stable and filtrable.

The purpose of this paper is to report the finding of toxic algae in a small lake in northeastern Colorado in July of 1939.

A farmer living in Weld county, Colo., approximately 30 miles from Fort Collins, brought in for diagnosis an adult Pekin duck which, with three others, he had found dead on the lake near his home. This lake, of approximately 10 acres in area, was

shallow and had no outlet. It was used only to store surface water.

The farmer stated that during the preceding week he had noticed dead fish (carp) along the water's edge. When he found the dead ducks he walked around the lake and found a number of dead wild birds, either in or near the water. He also saw more dead fish and a few dead snakes and salamanders. When questioned about live-stock poisoning, the farmer stated that a few days previously a 4-day-old calf had died suddenly after swimming across an inlet of the lake.

An autopsy was made on the duck but no lesions were found and no diagnosis was made. Water samples submitted for chemical examination* were negative for arsenic and strychnine, had a very low concentration of inorganic salts, and had a pH of 6.7.

On July 1, one of the farmer's horses which had been watered at the lake exhibited some symptoms which prompted him to call a veterinarian.† The doctor's examination showed the horse to have a subnormal temperature and to be somewhat lethargic. No diagnosis was made, but the animal was apparently normal the next day.

The veterinarian came to our laboratory to discuss his findings and brought with him a black-crested heron which showed a partial paralysis. The bird seemed to be alert, held its head erect, but could not stand or walk. However, it recovered completely in a few days.

On July 2, a trip was made to inspect the lake. Numerous dead fish and dead wild birds were found, and it was noted that the water of most of the lake was green with algae. At one end of the lake the algae had been piled up by the wind, with the effect that the water had the color and consistency of thick green paint (fig. 1). A quantity of the algae was obtained; also

*Chemical analysis made by J. W. Tobiska, chemistry section, Colorado Experiment Station.
†K. J. Hester of Greeley, Colo.

*From the Colorado Experiment Station.

TABLE I—Feeding experiments with algae.

ANIMAL	MATERIAL GIVEN	QUANTITY	METHOD	RESULT
Rabbit	Algae as collected No. 1*; 24 hours in refrigerator	20 cc.	By mouth	Dead in 1 hour
Guinea pig	Algae as collected No. 1; 24 hours in refrigerator	10 cc.	By mouth	No effect
Guinea pig	Algae as collected No. 1; 24 hours in refrigerator	10 cc.	By mouth	No effect
Rabbit	Algae as collected No. 1; 72 hours in refrigerator	20 cc.	By mouth	Dead in 48 hours; no evident lesions
Rabbit	Water filtered from algae No. 1	20 cc.	By mouth	No effect
Rabbit	Algae heated 80° C. 20 minutes —No. 1	20 cc.	By mouth	No effect
Rabbit	Algae as collected No. 2†; 96 hours in refrigerator	20 cc.	By mouth	No effect
Rabbit	Algae as collected No. 2; heated to boiling	20 cc.	By mouth	No effect
Rabbit	Algae as collected No. 2; 96 hours in refrigerator	10 cc.	Intraperitoneally	Dead in 1½ hours
Two chickens 240 Gm.	Algae as collected No. 1; 12 days in refrigerator	5 cc. each	Intraperitoneally	Both dead in 5 min.
Chicken 240 Gm.	Algae as collected No. 1; 14 days in refrigerator	2 cc.	Intraperitoneally	Dead in 5 minutes
Rabbit 810 Gm.	Algae as collected No. 1; 14 days in refrigerator	5 cc.	Intraperitoneally	Dead in 8 minutes
Guinea pig 860 Gm.	Algae as collected No. 1; 21 days in refrigerator	5 cc.	Intraperitoneally	Dead in 20 minutes
Guinea pig 660 Gm.	Filtrate of algae No. 1; 21 days in refrigerator	5 cc.	Intraperitoneally	Dead in 22 minutes
Guinea pig 630 Gm.	Algae No. 1, boiled 5 minutes; 21 days in refrigerator	5 cc.	Intraperitoneally	Dead in 20 minutes
Guinea pig 466 Gm.	Algae No. 1, boiled 30 minutes; 21 days in refrigerator	5 cc.	Intraperitoneally	Dead in 38 minutes

*Algae No. 1 collected 7-2-39.

†Algae No. 2 collected 7-5-39.

some dead fish and dead birds were taken to the laboratory. Another partially paralyzed black-crested heron also was taken. It recovered in a few days.

There seemed to be two possible explanations for the death of the birds at this lake: Botulism, as described by Kalmbach,² and toxic algae, as described by Fitch and his coworkers¹ in Minnesota.

In an endeavor to determine the presence of *Clostridium botulinum*, cultures were

made from some of the fish, from water near the fish, and from the viscera of one of the dead birds, suitable methods being used for anaerobic cultivation, but the results were negative. The same materials, fed or injected into laboratory animals, failed to produce any evidence of toxicity.

The laboratory experiments were conducted on four guinea pigs and one rabbit. The guinea pigs were given, respectively, 5 cc. of filtered emulsion of fish intraperi-

toneally; 10 cc. of unfiltered emulsion of fish by mouth; 10 cc. of the filtered water intraperitoneally; and 14 cc. of the unfiltered water by mouth. These injections had no effect on any of the guinea pigs except the third, given the filtered water, which died in 72 hours. There were no evident lesions and the cause of death could not be determined. Media was inoculated using both aerobic and anaerobic methods, but no significant organisms were isolated. A rabbit was given 30 cc. (= 1 ounce) of the unfiltered water by mouth, without effect.

Experiments were then made with the algae, which were identified by L. W. Durrell of the botany section as *Anabaena floss-aquae*.

The freshly collected algae, when given by mouth, killed one of the experimental rabbits but, when stored at refrigerator or room temperature, proved to be nontoxic in the quantities fed. When given intraperitoneally, the material was uniformly fatal to rabbits, guinea pigs, and chickens, even after being kept for three weeks at refrigerator temperature (table I).

Algae collected on a second visit to the lake, three days after our first trip, proved to be less toxic. This lot is designated as No. 2 in the table. Not as much concentrated material could be found this time and, apparently, that which was obtained had begun to decompose.

A sheep was force-fed 1,500 cc. (= 3 lbs., 2 oz.) of the second lot of algae, which had been kept at room temperature for 48 hours. The sheep showed no ill-effect. The following day it was fed 3,000 cc. (= 6 lbs., 4 oz.) of the same material, again with no noticeable effect.

To exclude the possibility of the toxic principle of the algae being one of the toxins of *Cl. botulinum*, four guinea pigs were given intraperitoneally 10 cc. each of the algae (No. 1 first collected) and three of them were given simultaneously 2 cc. each of botulinus antitoxin A, B, or C,* intraperitoneally, the fourth being left for a control. All died in approximately 15 minutes.

*Provided through the courtesy of the Jensen-Salsbery Laboratories, Kansas City, Mo.

To determine the heat stability of the toxic algae, guinea pigs were inoculated intraperitoneally with algae boiled for five minutes and for 30 minutes. The algae were sufficiently toxic to kill the animals in the amounts given.

A quantity of the algae was filtered through a Seitz bacterial filter, and a 5-cc. dose of the resulting filtrate killed a guinea pig in 22 minutes.

No macroscopic lesions, except some congestion of the blood vessels of the peritoneum, were noted upon autopsy of the experimental animals. The foamy tears described by Fitch were noted in all of the guinea pigs which died from effects of the algae.

DISCUSSION AND SUMMARY

While it is believed that the death of the ducks and the wild birds found around the lake were due to the effect of the toxic algae, the cause of the deaths of the fish and reptiles is only speculative. It was first believed that they might have died of suffocation, due to the fact that the water was stagnant. Carp, however, are probably rather resistant to suffocation, and the lake was no more stagnant than before the fish began to die.

The experimental work has shown that the algae were toxic to rabbits, guinea pigs and chickens. The poison was not neutralized by botulinus antitoxin A, B, or C. The water filtered from the algae was toxic to guinea pigs. The symptoms and rapid death of the experimental animals following the administration of the algae corresponded to the description given by Fitch *et al* and was not characteristic of botulinus poisoning.

The ground-up emulsion of dead fish, either filtered or unfiltered, was not toxic to guinea pigs. *Clostridium botulinum* was not isolated from the fish or one of the dead birds by suitable anaerobic methods.

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Poultry Mortality*

By L. E. BOLEY,† D.V.M., and ROBERT GRAHAM, D.V.M.

Urbana, Ill.

THE ESTIMATED value of poultry and egg products on Illinois farms annually exceeds \$1,000,000. The mortality is seldom lower than 10 per cent and sometimes as high as 40 to 50 per cent.¹ Lubbehusen and Beach² state that the mortality in approximately 2,100 birds during the first two years of production approximated 40 per cent of the birds present at the age of 6 months. Mortality in the laying flocks owned by the Pennsylvania State College, as reported by Marble,³ ranged from 20 per cent to as high as 58 per cent over a five-year period. Kennard and Chamberlin⁴ report the following mortality per cent of pullet layers: 1921-24, 13.2; 1925-28, 38.47; 1929-32, 55.5. At the Illinois Experiment Station the following disease entities were encountered in 6,800 fowls at autopsy: Parasitic worms, 2,738, or 34.4 per cent; bacterial disease, 2,081, or 26.2 per cent; filtrable viruses, 1,476, or 18.6 per cent; protozoa, 1,431, or 18 per cent, and nutritional diseases, 225, or 2.8 per cent.⁵ Thus, poultry mortality continues to be one of the most serious problems confronting the industry, notwithstanding that progress has been made in the recognition and control of many poultry diseases.

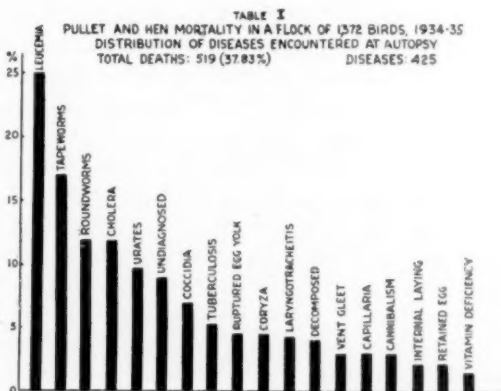
The data on mortality in a large flock of hens and pullets reported herein is based on observations during the past four years. The flock consisted of several light and heavy breeds that were housed and fed according to approved methods of poultry management. The birds in this flock were housed in laying pens containing 15 to 85 birds per pen. All birds placed in the laying pens were banded with individual and pen bands.

*From the laboratory of animal pathology and hygiene, College of Agriculture, University of Illinois. Presented before the Section of Research and Poultry at the 76th annual meeting of the A.V.M.A., Memphis, Tenn., August 28 to September 1, 1939.

†Assigned to the laboratory of animal pathology and hygiene by the state department of agriculture to assist in diagnostic work.

The mortality studies in this flock were started on September 15 of each year and, simultaneously, the cull birds in the laying flock were sold. Desirable pullets from the preceding spring hatch were used to replace those that died or were culled from the flock. Pullet replacements were put in laying houses at approximately 6 months of age.

Sick and dead birds were autopsied from the flock daily. In some cases the autopsies were supplemented by microscopic, histopathological and bacteriological examinations. All birds were vaccinated for fowl



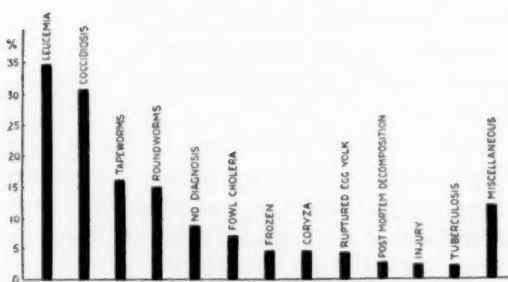
pox as a routine procedure each year. An outbreak of laryngotracheitis necessitated the vaccination of the entire flock with laryngotracheitis vaccine during the first year of the study, 1934-35.

1934-35.—Studies on this flock of 1,372 hens and pullets revealed that the mortality per cent was 37.8. The following disease entities and parasitic infestations were encountered in the flock during that period (figures = per cent): Leucemia and/or leucemia-like diseases, 25; tapeworm, 17; roundworm, 12; fowl cholera, 12; uremia, 9.7; undiagnosed, 9; coccidiosis, 7; tuberculosis, 5.3; ruptured yolk, 4.6; postmortem decomposition, 4; laryngotracheitis, 4.3;

cannibalism, 3; coryza, 4.6; retained egg, 2.2; and vitamin A deficiency, 1.5 (table I). Mortality in the flock reached its height during the month of January and the lowest point in October.

1935-36.—The following data were collected on the flock during 1935-36: The

TABLE II
PULLET AND HEN MORTALITY IN A FLOCK OF 1501 BIRDS, 1935-36
DISTRIBUTION OF DISEASES ENCOUNTERED
IN 334 DEATHS (22.2%)



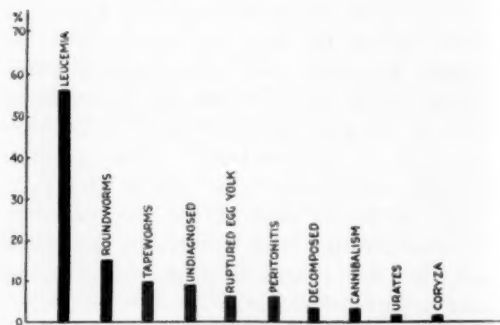
flock consisted of 1,501 hens and pullets, with a total mortality of 334 birds, or 22.2 per cent. Diseases and parasitic infestations encountered were (figures = per cent): Leucemia and/or leucemia-like diseases, 34.7; tapeworms, 16; roundworms, 14.9; coccidiosis, 30.8; undiagnosed, 8.6; fowl cholera, 7.1; frozen, 4.4; coryza, 4.4; ruptured egg yolk, 4.1; postmortem decomposition, 2.6; uremia, 2.6; injury, 2.3; and tuberculosis, 2. Miscellaneous disease entities, such as cannibalism, Capillaria, humpfoot, internal hemorrhage, peritonitis, blackhead, laryngotracheitis, vitamin A deficiency, inanition, impaction of crop and proventriculus, enteritis, and pneumonia numbered 43, or 12 per cent (table II). The highest mortality was recorded during the month of January, while in September it was the lowest during the year. Mortality during July and October was not recorded.

1936-37.—Studies continued on the flock of 1,432 birds during the year 1936-37 showed a hen and pullet mortality of 27.04 per cent. The following disease and parasitic infestations were observed (figures = per cent): Leucemia and/or leucemia-like diseases, 56; roundworms, 15; tapeworms, 10; undiagnosed, 10; peritonitis, 7; ruptured egg yolk, 7; postmortem decomposi-

tion, 4; cannibalism, 4; uremia, 2; and coryza, 2 (table III). Mortality reached its peak during the month of June and the lowest level during the month of October.

1937-38.—A mortality of 777 birds, or 47.9 per cent, was observed in 1,622 hens and pullets during the year 1937-38. The following diseases and parasitic infestations were encountered (figures = per cent): Leucemia and/or leucemia-like diseases, 53.1; cecal worms, 38.2; roundworms, 19.8; tapeworms, 14; undiagnosed, 12.1; postmortem decomposition, 6.6; coryza, 5.6; peritonitis, 4.8; ruptured egg yolk, 2.9; internal hemorrhage, 2; cannibalism, 1; and miscellaneous diseases (including uremia, salpingitis, fecal concretment, retained egg, injury, torticollis, and eversion of cloaca), 2 (table IV). Mortality during the year reached its highest

TABLE III
PULLET AND HEN MORTALITY IN A FLOCK OF 1420 BIRDS, 1936-37
DISTRIBUTION OF DISEASES ENCOUNTERED
IN 384 DEATHS (27.04%)



peak during the month of December and the lowest level during October (table V).

Of the 1,622 birds included in the studies during 1937-38, 1,051 pullets were housed in 21 pens, 474 hens were housed in 25 pens, and 4 pens contained 97 hens and pullets. The total mortality in the 21 pens of pullets was 600, or 78 per cent of the total mortality of the entire flock. The mortality in the 25 pens of hens was 129, or 15 per cent of the total mortality. Losses in the 4 pens of hens and pullets totaled 6 per cent of the entire mortality.

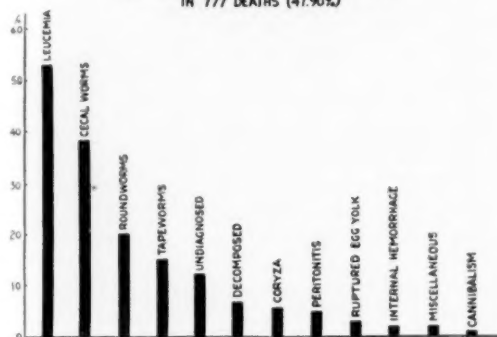
The incidence of leucemia in the pullets was high as compared with that in the hens. Lesions of leucemia were observed

in 330 of the 1,051 pullets, while a diagnosis of leucemia was made in 61 of the 471 hens. Leucemia was diagnosed in 22 birds from the 4 pens of hens and pullets. Seventy-nine per cent of the lesions of leucemia encountered in the flock during the year were present in the pullets, while 14 per cent of the lesions of leucemia were observed in the hens. Lesions of leucemia

16.5 per cent, were infested with tape worms; 192, or 44.2 per cent, were infested with heterakids. Approaching the data in another way, 72 of the total 109 tapeworm infestations, or 66 per cent, were present in leucemic birds; 93 of 154 roundworm infestations, or 60 per cent, were diagnosed in birds showing lesions of leucemia; and of 297 heterakid infestations 192, or 65 per cent, were observed in leucemic birds.

Beaudette and Hudson⁷ report the following findings in 10,000 avian autopsies in New Jersey: Bacterial infection, 2,936,

TABLE II
PULLET AND HEN MORTALITY IN A FLOCK OF 1,622 BIRDS, 1937-38
DISTRIBUTION OF DISEASES ENCOUNTERED
IN 777 DEATHS (47.90%)

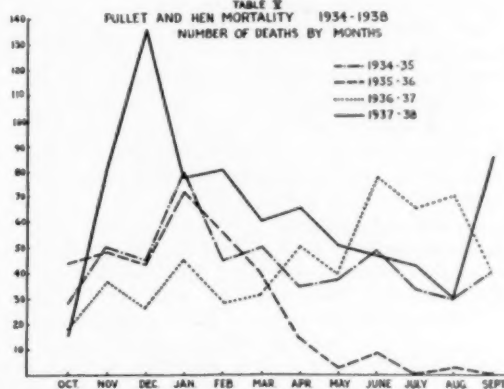


were found in 6 per cent of the 4 pens of hens and pullets. The distribution of lesions of leucemia in the different organs is set forth in table VI.

From the data obtained during the four-year period, it is evident that leucemia and internal parasites are the important disease entities present in the flock (table VII). Tuberculosis, laryngotracheitis, and fowl cholera were responsible for a combined mortality of 22 per cent during the year 1934-35. Fortunately, disease-control measures, such as strict sanitation, vaccination and culling, suppressed these diseases during the preceding three years.

Clapham⁶ assumes that the presence of leucemia virus causes a lowering of the helminth resistance, allowing more parasites to develop. In an effort to correlate parasitic infestation with the evidence of leucemia, the following data were obtained during the studies in 1937-38. As previously stated, the mortality was 777, or 47.9 per cent, with 432 birds, or 53.6 per cent, showing lesions of leucemia and/or leucemia-like diseases. Of the 432 birds presenting lesions of leucemia 93, or 20 per cent, had roundworm infestations; 72, or

TABLE III
PULLET AND HEN MORTALITY 1934-1938
NUMBER OF DEATHS BY MONTHS



or 29.3 per cent; parasitic diseases, 2,094, or 20.9 per cent; virus diseases, 1,078, or 10.7 per cent; and nutritional diseases, 561, or 5.6 per cent. The miscellaneous group totaled 2,585, or 25.8 per cent, and included 2,185 undiagnosed cases.

TABLE VI—Distribution of lesions of leucemia in 413 birds from a flock of 1,622 hens and pullets (figures = per cent).

Liver	62.7	Intestine	3.6
Spleen	31.7	Oviduct	3.3
Kidney	22.0	Muscle	2.1
Ovary	15.0	Heart	1.2
Mesentery	8.7	Gizzard	0.9
Nerve	5.3	Proventriculus	0.7
Eye	4.1	Cloaca	0.2

Studies have been made on specimens submitted from farm flocks throughout Illinois during the period July 1, 1931, to December 30, 1938, and therefore present a cross section of the disease factors encountered in different localities. In a total of 15,234 autopsy specimens, 15,891 diseases and parasitic infestations were iden-

TABLE VII—Disease entities encountered in one flock during the period 1934-38 (figures = per cent).

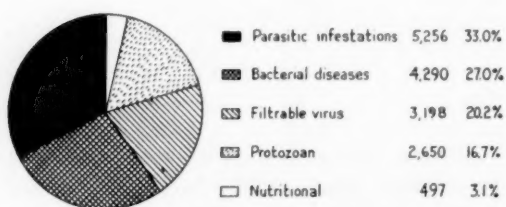
Total Number of Autopsies—2,014.

Total Number of Birds—5,927.

	1934-35	1935-36	1936-37	1937-38
Leucemia	25.0	34.7	56.0	53.6
Tapeworms	17.0	16.0	10.0	14.9
Roundworms	12.0	14.9	15.0	16.4
Cecal worms .....	....	....	....	35.0
Postmortem decomposition	4.0	2.6	4.0	6.6
Coryza	4.6	4.4	2.0	5.6
Fowl cholera	12.0	7.1	....	....
Frozen .....	....	4.4	....	....
Peritonitis .....	....	....	7.0	4.8
Uremia	9.7	2.6	4.0	.4
Ruptured egg yolk.....	4.6	4.1	7.0	2.9
Tuberculosis	5.3	2.0	....	....
Undiagnosed	9.2	8.6	19.0	12.1
Vent gleet.....	3.0	....	....	....
Capillaria	3.0	....	....	....
Vitamin A deficiency.....	1.5	....	....	....
Laryngotracheitis	4.3	....	....	....
Cannibalism	3.0	....	....	1.1
Retained egg	2.2	....	....	....
Coccidiosis	7.0	30.8	....	....
Injury .....	....	2.3	....	....
Internal hemorrhage .....	....	....	....	2.0
Miscellaneous .....	....	12.0	....	2.0
Mortality per cent.....	37.8	22.2	27.04	47.9
Number of birds.....	1,372	1,501	1,432	1,622

tified. A study of the incidence of the disease observed shows that 5,256, or 33 per cent, were parasitic infestations and 4,290, or 27 per cent, were bacterial diseases. The presence of filtrable virus diseases is suggested in 3,198 positive diagnoses, or 20.2 per cent, while protozoan diseases were observed in 2,650 cases, or 16.7 per cent.

TABLE VIII
DISEASES OF POULTRY
15,891 DISEASES AND PARASITIC INFESTATIONS FOUND IN 15,234
AUTOPSY SPECIMENS
JULY 1, 1931-DECEMBER 31, 1938



Four hundred and ninety-seven specimens, or 3.1 per cent, presented lesions and symptoms of nutritional diseases (table VIII).

A classification of the 5,256 parasitic infestations encountered in the 15,234 autopsies

reveals that tapeworms were observed in 2,097 birds, or 39.9 per cent; ascarids, 1,465, or 27.8 per cent; cecal worms, 680, or 12.9 per cent; Capillaria, 518, or 9.8 per cent; coccidia, 255, or 4.9 per cent; external parasites, 127, or 2.4 per cent; gizzard worms, 89, or 1.7 per cent; and trichomonads, 15, or 0.3 per cent (table IX). These data clearly show that taeniasis is the most prevalent internal parasite of poultry. It is apparent that the practice of strict sanitation and the control of the intermediate hosts of internal parasites is not rigidly practiced. The parasitic factor in poultry mortality constitutes one of the most important issues in poultry production. Internal parasites not only lower the vitality of the fowl and reduce egg and meat production, but they increase susceptibility to infection and nutritional and protozoan disease. In some cases it is believed that internal parasites may serve as mechanical carriers for a variety of bacterial and protozoan diseases.

Control of disease is dependent on an early diagnosis and the application of strict

sanitation and management. Careful selection of vigorous, disease-free breeding stock, improved husbandry and sanitation, correct early diagnosis, and proper appreciation of the carrier features of disease must be given greater attention by the flock owner. Cure-all remedies should be avoided and proper utilization of available

mitted to the division of animal pathology and hygiene, University of Illinois, over a period of 7½ years is recorded.

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Discussion

M. W. EMMEL: Dr. Boley, have you noticed whether the high incidence of intestinal parasites in these birds has any relation to the high incidence of leucemia?

H. R. HESTER: Dr. Boley is not here to answer your question, and I do not feel qualified to deal with it.

A. J. DURANT: In Missouri, four or five years ago, the incidence of fowl paralysis declined from 40 per cent to 5 per cent and, as far as I know, there is not much difference in the parasites. Our experience indicates that many cases of the disease occur in some years, and few in others.

HUGH HURST: Has a study been made to determine the percentage of cases of paralysis that are of the leucosis type as compared with the percentage that are of a nutritional nature?

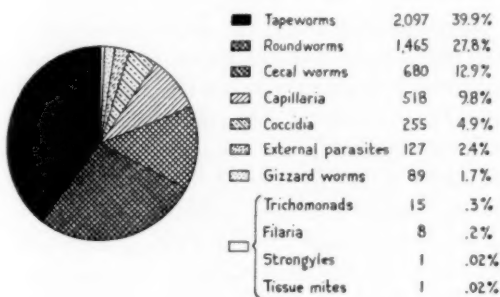
DR. HESTER: I do not believe that any work on that has been done in our group. I understand that a study is being made at the present time, but I do not know of the details.

DR. HURST: My reasons for asking that question are, first, that I noticed several years ago that the people who were feeding the most hard grain to their poultry also had the most paralysis in their flocks. In some cases, the hens had been forced to eat a portion of mash. In those cases the incidence of paralysis was greatly reduced. In experiments with paralyzed birds that had been brought to the laboratory, I found that, invariably, they would refuse to eat mash.

The next year I forced the birds to eat mash—it was of a good quality, high in cod liver oil, and I added some extra cod liver oil—and also an abundance of good alfalfa. This feed helped to bring a large percentage of the affected birds back on their feet.

The custom in my vicinity has been to feed the birds hard grain in the morning and also in the evening, and some have fed it three times a day. Generally, one-third of the hard grain has been fed in the morning, and two-

TABLE IX
PARASITIC INFESTATIONS OF POULTRY
5,256 INFESTATIONS FOUND IN 15,234 AUTOPSY SPECIMENS
JULY 1, 1931-DECEMBER 31, 1938



veterinary service must be increased in order to reduce poultry mortality. The diagnosis and supervision of disease control constitute a responsibility of the veterinarian.

SUMMARY

Mortality studies were made on one flock of approximately 1,500 hens and pullets over a period of four years. Sick and dead birds were autopsied daily with microscopic, histopathological and bacteriological examinations supplementing some of the autopsies. Losses in the flock were recorded (figures = per cent): 1934-35, 37.87; 1935-36, 22.2; 1936-37, 27.04; and 1937-38, 47.099. In the flock studied it appears that leucemia and internal parasites are the important factors in the mortality. The incidence of leucemia as observed at autopsy increased from 25 per cent in 1934-35 to 53.1 per cent in 1937-38. Seventy-eight per cent of the total mortality occurred in the pullets of the flock during the year 1937-38, while 79 per cent of the lesions of leucemia were observed in the pullets.

A classification of the disease entities diagnosed in 15,234 poultry specimens sub-

thirds at night. I have induced many of our producers to feed the hard grain only at night. The amount given is governed by the age of the birds; growing birds are allowed to consume all they will, the early hens not over 10 or 11 pounds in the winter and, 2-year-olds and over, a little less than that. In those flocks paralysis is now an unimportant issue.

E. P. JOHNSON: I believe that we must be careful not to confuse nutritional and infectious diseases. It seems that enough experimental work has been done to prove that leucosis is not a nutritional disease. Such an experiment was made in Ohio and we did the same thing in Virginia. We are convinced that nutrition plays but a minor part, if any. To be certain that we are dealing with fowl paralysis, I think that a histological study of the bird should be made.

DR. EMMEL: We believe that the development of many of these manifestations is based upon hemocytoblastosis. We have been able to produce hemocytoblastosis by three different nutritional deficiencies and, in the case of one, we have been able to produce paralysis very similar to that which we get from the indoor. We can produce typical leucemia merely by nutritional deficiency. Although I do not think that this group is of the nutritional disease type, I do believe that various nutritional deficiencies are strong contributory factors.

Thiamin Chloride

Thiamin chloride or vitamin B₁, produced synthetically since 1937, is a colorful drug, although all of its uses have yet to be regimented. Hidden in the unknown factor of rice bran discovered many years ago by Eijkman as the agent deficient in the diet of beriberi victims, it has been unmasked and found to be a pure chemical easily produced and easily employed. In its pure form this vitamin B fraction is proving to be a great aid in the studies of nutrition and therapeutics.

Thiamin chloride is a catalyst engaged in the removal of the products of destructive carbohydrate metabolism, according to prevailing conceptions of its action. Medically, it rates higher than food adequately supplied with vitamin B₁ because it can be given parenterally where the intake, though sufficient, is not utilized. Vitamin B₁ is not stored away for future use like vitamin A. To preserve organic normalcy the intake of vitamin B₁ must be constant and suffi-

cient. Lack of it is expressed by organic weakness and dysfunction leading headlong to nervous cataclysms.

The work of Patton, which demonstrated its relation to experimental fright disease, leaves a broad field for study of the many disorders which obviously lie between the slight and complete deficiency of thiamin chloride.

Reading of Farm Papers Is Aid to Practitioner

The reading of farm papers, not as a pastime but as a means of keeping up to date, is important to practitioners of veterinary medicine. The articles they contain on animal production are refreshing material written by well chosen men and the *ensemble* is a true picture of the field in which we labor, of the thoughts and the problems of our best clients. Animal production and veterinary medicine are interlocked but knowledge of them has become too vast to justify the internecine quarrels which once upon a time pitted the one against the other.

Army Horses and Mules

Permit me to speak what is on my mind in regard to the use of horses and mules in the army. According to the September JOURNAL, Congress and the quartermaster department believe that animal transportation is no longer important in military operations. They may be more qualified to judge that matter than I, but with the wolf of another world war at the door, I have good reason to question their wisdom. Most of the decisive fighting will have to be done on the ground and, no doubt, today as ever before, horses and mules will be an essential factor in winning any man's war. When an army meets enemy resistance, speed is no longer as much of a deciding factor as unfailing reliability. My admonition is to breed more mares, as the army and agriculture may need them. It is wise to be prepared.—W. B. Redman, D.V.M., Dow City, Iowa.

Blood Parasites of the Dog*

By R. L. MUNDHENK, Ph.D., D.V.M., and J. E. GREENE, D.V.M., M.S.

Auburn, Ala.

THIS DISCUSSION will be concerned only with the larval type of hematozoa. Mönnig lists seven microfilariae, one sheathed and six unsheathed, as occurring in the blood stream of the dog, and one also unsheathed, which is presumably found only in the subcutaneous lymph spaces. Of these the *Dirofilaria immitis*, or canine heartworm, is the only one to which he gives more than the briefest mention. The acutiscula is dismissed with a paragraph, stating that it is confined to Italy and Indo-China and that its microfilariae are found in the subcutaneous lymph spaces, although he lists the parasite among those occurring in the blood stream. The dracunculoides is given but three lines, which restrict it to Africa, and the remaining four parasites are allotted collectively a line and a half in which they are simply stated to be rare.

At the present, small animal practitioners, lacking definite and authoritative information, are making diagnoses of heartworm infection merely from the low-power recognition of wriggling, lashing hematozoa in peripheral blood, and are treating the positives, with varying degrees of success, with antimony compounds intended to sterilize or kill the adult parasites.

It appears possible that a positive diagnosis of heartworm infection, from the simple presence of larvae in the blood stream, may almost be justified in certain regions, particularly those along the south Atlantic and Gulf coasts. However, a disconcerting fact, from the standpoint of accuracy and end results, is that even a few hundred miles inland, where the blood of 76 per cent of pound animals was found to teem with hematozoa apparently identical on examination of fresh, unstained blood specimens, less than 1 per cent of these

same animals were found to be positive for adult *D. immitis* on postmortem examination.

Because less than 200 animals have thus far been examined, the percentages given are not necessarily accurate and can be considered only reasonably correct for that portion of the country from which the dogs were obtained—east central Alabama and west central Georgia. On the basis of these figures, nevertheless, it appears justifiable to invite attention to the probability that conditions similar to those mentioned may exist in other portions of the country from which an increasing number of cases of supposed heartworm infection are being reported.

Assuming the condition to be more than local, the questions naturally following the above statements would be, first, "If these larvae are not those of the heartworm, what are they?" and, second, "Whatever they are, what is to be done about them?" Quite at variance with the accepted policy in papers of this nature, our answer to both questions, given regretfully but frankly, is "We do not know." Further, after spending considerable time on the problem, we are forced to say, with equal frankness, that to the best of our knowledge and belief, no one yet knows the answers.

In the differentiation of these parasitisms, clinical and postmortem examinations, serological methods and morphological comparisons of the hematozoa themselves would seem to offer the means of diagnosis.

There being nothing pathognomonic in the symptom complexes of these conditions, clinical examination appears to give little if any help except to point in the general direction of the undifferentiated infections.

Postmortem examination in the case of heartworm infection settles quite definitely (after it is too late) the particular case in

*From the department of anatomy and histology, School of Veterinary Medicine, Alabama Polytechnic Institute. Presented before the Section on Small Animal Practice at the 76th annual meeting of the A.V.M.A., Memphis, Tenn., August 28 to September 1, 1939.

question but leaves us still in doubt in the other parasitism and contributes no information of value to aid in preventing the spread of the condition or in treating existing cases.

With regard to serological methods, we have unsuccessfully attempted to devise a method of diagnosis by either allergic skin reactions or precipitin tests. Although both methods yielded positive reactions for the parasite concerned, the close biological relationship of the two parasites appears, thus far, to prevent satisfactory differentiation.

Detailed morphological examination of the hematozoa from the standpoint of the helminthologist is a procedure entirely too complicated to be of practical use to the veterinarian, depending, as it does, upon the determination of the relative locations in the microfilariae of a number of anatomical features difficult to identify, such as the nerve ring, excretory pore, excretory cell, first genital cell, anal pore and last tail cell.

Until our present knowledge has been increased by further investigation, we suggest a temporary method of differentiating the microfilariae of the heartworm from those of the unknown parasite by a comparison of the cephalic extremities of the stained hematozoa. In this examination the *Microfilaria immitis* is found to be of obviously greater body width while the cephalic extremity is decidedly narrower, the unknown larva having a distinctly bulbous anterior end as compared with the gradually tapering extremity of the *immitis*. A further point of variation easily recognizable is that the anterior somatic cells of the *immitis* extend much nearer to the anterior extremity of the hematozoön than in the unknown. The technic of preparing and staining the hematozoa for differentiation is not difficult and suggestions as to the method will gladly be furnished.

Although having nothing to do with differentiation, an interesting entomological observation in this regard, recently made by Christensen and not yet published, is that while the *immitis* has previously been considered viviparous, it is actually ovo-

viviparous, the ova embryonating just prior to extrusion.

In attempting to classify this unknown microfilaria, we are confronted with two interesting facts: First, the Fulleborn measurements do not tally at all closely with the published descriptions of any of the group mentioned and, second, 92 per cent of those animals harboring the unknown hematozoa, on postmortem examination showed infection with *Spirocerca sanguinolenta*, or the so-called esophageal worm.

Concerning this latter parasite, which apparently encysts quite as commonly in the aorta as in the esophagus and stomach, attention is invited to several apparent ambiguities among the accepted ideas of its life cycle. Quoting from the second (1938) edition of Mönning's *Veterinary Helminthology and Entomology*:

The eggs are passed in the feces of the host and hatch only after they have been ingested by a suitable coprophagous (dung-eating) beetle.

The larvae develop to the infectious stage and become encysted in the beetle, chiefly on the tracheal tubes. If such beetles are swallowed by an unsuitable host, the larval worms become encysted again in the esophagus, mesentery or other organ of this host. Such cysts have been found in numerous amphibia, reptiles, birds and small mammals. The final host may become infected by ingesting either beetles that contain infective larvae or other animals in which the encysted forms occur. On being liberated in the stomach, the larvae penetrate the stomach wall and, reaching the arteries migrate in the walls of the coronary (?) and gastroepiploic arteries to the coeliac artery and thence to the aorta, reaching the thoracic aorta in about three weeks. Some may enter veins and reach other organs. The walls of the oesophagus and stomach are apparently also reached *via* the blood.

One suspected discrepancy in the above series of statements is that while the ova of the *S. sanguinolenta* are exceedingly numerous and quite characteristic in appearance, they are not known to be commonly recognized in routine fecal examinations. Another is that while the quotation presumably explains the path of the parasitic ova and larvae when extruded from adults existing in esophageal and stomachic cysts,

it fails to supply a route for those coming from adults existing in aortic cysts and which, until after embryonation, could not reach the outside world in any manner explainable by this hypothesis. The idea that nature, in her fantastic extremes to insure the perpetuation of the race, would permit approximately one-half of the adult parasites to wall themselves in a blind alley is rather untenable. There must be some escape for these latter ova or their larvae.

It would seem, therefore, that the life cycle of the *S. sanguinolenta* deserves a careful rechecking, since it appears possible that the unknown hematozoön might be a definite larval stage of this parasite (as suggested by Lewis in India over 50 years ago).

Another and a more plausible suggestion, made by E. W. Price, assistant chief of the zoölogical division of the federal bureau of animal industry, is that the larvae in question are those of other of the filariidae whose adults exist in the subcutaneous, subpleural or subperitoneal fasciae or in the mesenteries, rather than in the right heart chambers, as do those of the *D. immitis*. This probability also occurred to us early in our investigations but, after literally making hamburger out of a large number of dog carcasses, we are as yet unable to report the finding of a single adult parasite to which the hematozoa could be ascribed, other than the aforementioned *S. sanguinolenta*.

The persistent idea of some observers that a larval stage of the common hookworm might occur in numbers in the blood and there be confused with other parasites is rather contraindicated by the exceedingly large number of larvae often present in the blood of a 44 kg. (= 20 lbs.) dog (estimated to run as high as 50,000 to 200,000, or more), as well as by outstanding morphological differences in the larvae of this latter parasite. In considering the relatively low number of hookworm larvae that might be expected to be present in the blood stream of an animal at any one time, the finding of even one hookworm larva either would require many hours of patient searching or verge upon what might be

termed a microscopical accident. That a relatively few of the latter larvae may be present in the blood stream for a short time is admitted.

Regarding the desirability of being able, in practice, to differentiate between these parasites, we submit that, while moderate heartworm infections appear to yield reasonably well to established therapeutic measures, similar medication continued even to the point of severe antimony poisoning has failed (in our limited experience) to affect the hematozoa concentration in the blood of the other parasitism. This fact, at least in certain instances, may explain what have been regarded as failures with this line of treatment.

Since the dog is not included, at least to any extent, within the scope of federal investigational work because of its questionable status as a domesticated animal (although it was actually the first animal to be domesticated and, in fact, domesticated itself) and also because the various agencies interested in dogs have never seen fit to institute or support organized research in canine disease conditions, the solution of the minor problem which we have mentioned and many others of major importance no doubt rests with the small animal practitioner and some few state institutions, with what rather limited efforts they are able to put forth.

NATIONAL PROJECT TO DEAL WITH PROBLEMS OF CANINE HUSBANDRY IS URGED

It does not seem far-fetched to hope that in the not distant future representatives of the American Kennel Club and of other similar organizations, of the millions of unorganized dog owners, of the thousands of veterinarians and of the hundreds of business institutions supplying products used in canine husbandry, will meet, become acquainted with each other, consider the welfare of the dog, sound the doom of the cur and the stray dog (and, incidentally, of rabies) and take steps toward the erection and maintenance of a permanently endowed institution of national scope, the work of which would cover all canine problems rather than pathological problems alone,

and the findings of which would be made available to all parties concerned, according to their various interests.

Discussion

S. F. STAPLETON: In true heartworm disease characterized by larvae, there may not be a marked effect on general health. In some cases I have seen it looked as if the blood was teeming with larvae, and yet the animals were perfectly healthy. On the other hand, dogs with less marked infestation went down rapidly. Those cases usually responded to treatment.

DR. MUNDHENK: I think, Doctor, that you were dealing with true immitis. For a number of years we have been diagnosing and treating heartworm disease. Although the majority of our subjects have been pound dogs, less than 1 per cent of the cases have been caused by the *Dirofilaria immitis*. People on the coast know more about that condition than I and, as far as clinical manifestations of true heartworm disease are concerned, I know only what others have told me.

N. M. NEATE: Has anyone had experience with the effect of intravenous injections on the sense of smell in dogs?

A. V. YOUNG: I live in Louisiana, where quite a bit of hunting is done, and I own bird dogs myself. What you have mentioned occurs probably as a symptom of heartworm more than anything else. I do not believe that the treatment affects the dog's nose. I have seen many cases in which the treatment was continued and the sense of smell returned to normal.

J. M. BRYAN: Is there any regular treatment for the esophageal worm when it forms an abscess that produces vomiting?

DR. MUNDHENK: I do not know.

J. C. WRIGHT: I had three cases where the dogs actually starved to death. We passed a stomach tube and did various things, and the esophagus closed. In two cases we kept the esophagus open with a little knife and extracted some worms. That is the only way that we have been able to get worms out—by going inside.

J. L. RUBLE: I would like to answer Dr. Neate's question as to whether bird dogs "lose their nose" following heartworm treatment. In my practice several have "lost their noses" and along with the nose they have lost the dog.

A.V.M.A. Sponsors Vitamin Experiments

The Memphis convention paper of Russell and Morris on the following page is the second report of experimental work planned and conducted as an educational

exhibit by the local Committee on Arrangements for the New York meeting of the Association in 1938. The exhibit in its unfinished state attracted so much attention at the meeting that the Executive Board authorized the continuation of the demonstration at the Association's expense, with the request that it be documented for publication when completed. The first report of this work was published in the September 1939 issue, pp. 316-320.

Comparative Medicine

VETERINARY MEDICINE has a great future stretching ahead, for several reasons. Besides safeguarding an industry without which mankind could not carry on, it salvages important property for the state and its private owners. As a branch of science, it is broad and, as a division of medicine, it is comparative. There is no self-erected barricade to limit its work to one anatomy, one physiology, one pathology. In that respect it differs materially from the orthodox medical course. Laughing at animal medicine is a passing pleasure of the student of medicine, for veterinary medicine is biological in the literal sense of the phrase. In extent, zoölogy is its bourn and, in the investigational and clinical fields, its broad and fascinating character has enriched medical knowledge through the years (almost unnoticed, and with meager credit).

The great surgeons and physicians in all times have been "comparative" enthusiasts. Pasteur venerated Alfort, and Osler Montreal, where he taught veterinary physiology. The Mayo Clinic has capable veterinarians on its staff. The opportunity of working with animals in the U. S. bureau of animal industry developed such eminent scientists as Theobald Smith, Veranus A. Moore, Marion Dorset, C. N. McBryde, and others.

In fact, prominent men of medicine deplore the custom of specializing without acquiring and retaining a broad knowledge of medical science. The specialist may become a genius but, with rare exception, he adds little to posterity. The scientific-minded veterinarian is, therefore, happily oriented.

Vitamins and Vitamin Preparations in Small Animal Practice*

By M. L. MORRIS,† D.V.M., and W. C. RUSSELL,‡ Ph.D.

New Brunswick, N. J.

USING THE WORD disease in the broadest sense, that is, any departure from the normal, the diseases of the common species may be classified as due to a) traumas, b) invasion by viruses or microorganisms, and c) disturbances of the chemical processes of metabolism. The primary cause of diseases of the third group may be the lack of certain chemical substances in the diet, such as the vitamins, the failure of the animal body to form certain chemical substances, such as the hormones, or possibly a hereditary defect which inhibits the normal chemical process. Although traumas and invasions by viruses and microorganisms are not caused by disturbances of the chemical phases of metabolism, such disturbances may accompany or follow these disease conditions.

The present paper is concerned with those diseases in small animals, principally dogs and cats, which are now known to be caused by a lack of certain chemical substances in the dietary, namely the vitamins, and our present knowledge of their treatment. Attention will also be given to other diseases for which vitamins may be an aid in clinical treatment and to those diseases in the treatment of which consideration should be given to the use of vitamins. It should be noted that some diseases may be caused by a lack of chemical substances in the dietary other than those now classified as vitamins, such as certain inorganic elements and amino acids.

With the exception of vitamin D deficiency, which may be detected by the use of the x-ray, reliable, rapid, clinical laboratory methods for the determination of

vitamin deficiencies in small animals are not available at the present time.

Perhaps the best approach, if a vitamin deficiency is suspected, is to ascertain the dietary history of the animal. In obtaining such histories, it is common for the client to give information regarding the diet fed within the past three or four days. It is important, however, to know the list of foods which have been used over a period of several weeks or even several months, since too frequently the owner changes the diet when the animal becomes ill. If commercial dog foods have constituted the principal source of nourishment, it is important to know the brand of food employed, since it is well known that some foods are not only deficient in one or more vitamins but also in other essential constituents. When a list of foods which have been given the animal is obtained, this, when carefully considered with clinical and laboratory findings, offers considerable assistance in reaching a differential diagnosis.

Vitamin A

The principal rôle of vitamin A is the maintenance of the various specialized epithelial tissues. Wolbach and Howe¹ have presented a complete picture of vitamin A deficiency in the white rat and guinea pig. In these species a keratinized epithelium is found in place of the normal epithelium in the nares, larynx, trachea, bronchi, in the submaxillary, parotid and accessory salivary glands, in the urinary bladder, ureters and kidney pelves, the uterus, oviducts, prostate, epididymis and seminal vesicles, the conjunctiva, cornea and lacrimal glands. Although studies as extensive as these have not been conducted with other species, essentially the same changes probably take place in the dog and cat. Consequently, in disease conditions which involve the above-mentioned tissues, attention should

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†Raritan Hospital for Animals.

‡New Jersey Agricultural Experiment Station and Rutgers University.

be given to the use of vitamin A as a therapeutic aid.

Vitamin A has been erroneously designated the anti-infective vitamin. It is such to the extent that when enough is present to maintain normal epithelial tissues, the chances of invasion by disease organisms are lessened. However, there is no satisfactory evidence that the feeding of an excess of the factor develops a still greater resistance to disease invasion. Although not specific in this respect, probably the most important consequence of a lack of this vitamin is infection of the weakened tissues.

The factor may be supplied as the yellow-plank-pigment carotene which is converted to vitamin A in the animal body or as the preformed vitamin in fish liver oils and fish liver oil concentrates. The common species, with the possible exception of the cat, can convert carotene to vitamin A.

In considering the clinical applications of vitamin A, we shall first give attention to the most important and specific conditions in which it is indicated. (See table I, section I.)

CONDITIONS IN WHICH THE A FACTOR IS INDICATED

A clinical condition of the eye, called xerophthalmia, is a specific manifestation of the deficiency. Unless an animal's diet is corrected to include vitamin A, secondary infections will become superimposed, with chronic purulent conjunctivitis developing. Hart² mentions that ulceration of the cornea of dogs also may be due to this cause.

Since rapid laboratory methods for the detection of vitamin A deficiency are not available, a valuable clinical procedure which may be useful in suspected cases of the deficiency is to make a dark-room test. Several objects are placed about in a dark room. Next, the animal is placed in the room for a few minutes to permit accommodation of the pupillary reflex. The patient is then permitted to move about slowly among the objects. If it is able to do this and avoid the objects, night blindness probably does not exist.

In addition to the condition in which

vitamin A is specific, there are certain cases in which this factor has proved to be of therapeutic value (section II of table I). Of these, one of its most important uses is to treat simple and ulcerative keratitis not produced by specific infections. In such cases vitamin A may be used locally in the eye in the form of fish oil, as well as given internally with the food, if desired.

TABLE I—Vitamin A.

I. SPECIFIC DISEASES KNOWN TO BE DUE TO A LACK OF VITAMIN A AND CURED BY ITS ADMINISTRATION

- 1) Night blindness
- 2) Xerophthalmia

II. CLINICAL CONDITIONS IN DOGS AND CATS IN WHICH VITAMIN A HAS BEEN DEMONSTRATED TO BE OF THERAPEUTIC VALUE

Diseases of the Eye.—1) Keratitis, simple and ulcerative.

Diseases of the Urinary Bladder.—1) Cystitis, acute and chronic.

Wounds.—1) Traumatic and surgical.

III. DISEASES OF DOGS AND CATS FOR WHICH THE CLINICAL USE OF VITAMIN A SHOULD BE GIVEN CONSIDERATION

Diseases of the Eye.—1) Conjunctivitis; 2) blepharitis; 3) ectasia of the cornea, staphyloma; 4) iritis, iridocyclitis; 5) retinitis; and 6) panophthalmitis.

Diseases of the Urinary Bladder.—1) Urinary incontinence; 2) urethritis; 3) stricture urethra; 4) traumatic wounds; 5) cystic calculi; and 6) urethral calculi (cats).

Diseases of the Gastrointestinal Tract.—1) Acute enteritis; 2) chronic enteritis; 3) infectious feline enteritis; and 4) gastroenteritis from vermifuge, especially after oil chenopodium.

Diseases of the Respiratory System.—1) Bronchitis, acute and chronic; 2) congestion of lungs; 3) pleuritis; 4) tonsillitis; 5) coryza; and 6) rhinitis.

Diseases of the Genital Tract.—1) Metritis, acute.

Diseases of the Kidney.—1) Urea and inulin clearances decreased; 2) nephritis; 3) nephrosis; 4) dysfunction, tubular damage; 5) pyelitis; and 6) keratinization of renal pelvis.

Infectious Contagious Diseases.—1) Canine distemper: a) Virus and b) mixed infections.

The etiology and management of cystitis in dogs and cats, whether with or without calculus formation, is not yet well understood. Higgins³ pointed out the relation-

ship of vitamin A to the formation of stones in the urinary bladder of the white rat. Whether this is true of animals such as the dog and cat has not yet been definitely established.

In the handling of traumatic and surgical wounds, it has been reported that vitamin A, given internally and applied locally to the wound, serves as a valuable aid in bringing about healing.

In the instance of surgical patients, it is desirable that the storage of the factor be adequate before operating. It is also important that the daily requirement be maintained if normal wound healing is expected. Surgical patients are frequently fed liquid or soft, bland diets, which are often lacking in this vitamin. The addition to the diet of a vitamin A preparation, such as a fish liver oil or concentrate, will serve to correct the deficiency.

In addition to certain clinical conditions in which vitamin A has been demonstrated to be of definite value, we have also included (section II of table I) a list of certain conditions and diseases in which the use of vitamin A should be given consideration.

GENERAL DISCUSSION OF CONDITIONS RESPONDING TO VITAMIN A THERAPY

Diseases of the Eye.—In the management of diseases of the eye, in addition to the recognized local applications commonly employed, the use of cod liver oil, for example, in the eyes of distemper patients serves two purposes, namely, as a lubricant and for the effect of the vitamin A which it contains on the diseased mucous membranes. In addition to local application, the food also should contain an ample supply of this vitamin, or, if desired, it may be given separately as carotene or fish liver oils by mouth, particularly if the patient has total inappetence.

Canine Cystitis.—Cystic calculi of the urinary bladder,⁴ except for cystine calculi, are probably secondary to acute or chronic cystitis. In attempting to employ vitamin A in conjunction with an acid-ash diet in the treatment of canine cystitis, it became apparent that it was difficult to lower the

pH of dog urine sufficiently to obtain results. On the other hand, cystitis caused by certain types of infections responds to this form of therapy. The question then arises as to whether the results obtained are due to pH change or the use of vitamin A. Since vitamin A has a beneficial nutritional effect on the mucous membrane of the urinary bladder, it seems desirable that an ample intake of this substance be included, either in the treatment or prophylaxis, in all cases of canine and feline cystitis, either with or without calculus formation. In the case of the cat, so-called



Purulent condition of the eye resulting from vitamin A deficiency.

urethral sand, especially in male animals, is very troublesome. Vitamin A, together with ample fluids, is thought to be helpful in relieving the condition. In the treatment of cats it is important to remember that this animal probably does not convert carotene to vitamin A. The product of choice is, therefore, a fish liver oil, and not carotene.

Gastrointestinal Diseases.—Diseases of the gastrointestinal tract constitute the largest number of clinical cases treated by veterinarians. Intestinal diseases and acute and chronic enteritis with associated diarrhea, particularly in young dogs, are very common. When received, the general condition of such animals is usually not very satisfactory. The history ordinarily reveals that vermifuge has already been administered. Intestinal cramps with pain

are common symptoms. The appetite is usually impaired, gastrointestinal functions are abnormal, the eye is dull, often infected, and may contain mucopurulent discharge. Accurate diagnosis is important. Canine distemper must be ruled out. Experience indicates that in some instances it is possible to make a differential diagnosis if a complete blood count is taken. Recently, Russell and Morris⁵ pointed out that marked changes in the blood picture may not be characteristic of vitamin A deficiency. Experience has shown that the administration of fish liver oil or concentrate, or carotene, in addition to a bland diet and the usual clinical care, will greatly benefit these cases.

Canine Metritis.—In the treatment of canine metritis the work of DeVita,⁶ indicating the relationship and importance of ovarian function to hyperplastic endometritis, has aided greatly our knowledge concerning this troublesome disease. In the brood bitch it is important that the diet contain adequate quantities of vitamin A, which may aid in maintaining a normal condition of the uterine mucosa. In bitches which develop metritis after whelping, it is suggested that possibly the body stores of the vitamin were depleted during pregnancy, thus lowering the resistance of the tissues to infection. Hart² has called attention to the fact that the depletion of the body stores in females may result in the death of the fetus *in utero*, or the offspring may die soon after birth.

Kidney Diseases.—As a result of recent research, kidney diseases of the dog are assuming a more important rôle than formerly. Partial or total dysfunction occurs commonly in dogs, but less frequently in cats. Studies on experimental animals on a vitamin-A-deficient diet have shown that keratinization or thickening of the epithelium of the renal pelvis may occur. If the kidney is to be maintained in a normal, healthy condition, an important aid is an adequate intake of vitamin A.

Herrin and Nicholes⁷ have reported that vitamin A influences the urea and inulin clearances of the dog. This observation is very significant, since lowered urea clear-

ances have been reported by Green and associates⁸ as occurring commonly in dogs suffering from kidney damage.

Infectious Contagious Diseases.—Vitamin A can not be considered a specific for any contagious or infectious disease of either dogs or cats. It may serve to aid in maintaining the normal tissue resistance against invasion by viruses or bacteria. Once the infection is established, the vitamin has no specific curative value and is therefore more efficient as a prophylactic than as a therapeutic agent. If the animal's stores of vitamin A are maximum at the time a contagious disease is contracted, the prognosis may be more favorable than in depleted animals.

Canine Distemper.—Frohring⁹ has reported on the important relationship between vitamin A and canine distemper. The clinical experience of one of us (M. L. M.) in the handling of this disease would indicate that vitamin A offers no specific protection against either the virus or mixed infections of canine distemper. A dog well nourished and in normal health necessarily constitutes a more favorable distemper risk than a malnourished, depleted one.

Frohring⁹ has reported that the minimum curative dose which caused an increase in weight in puppies was 20 U. S. P. units per 100 Gm. ($= 3 \frac{1}{3}$ oz.) of body weight per day and that 70 units per 100 Gm. of body weight were necessary for maximum growth.

In selecting dog foods represented by the manufacturer to contain cod liver oil, it does not necessarily mean that the vitamin A potency is adequate. The food may contain insufficient oil, or, through processing and storage, much of its potency may have been lost.

Vitamin B₁

THE B₁ FACTOR IN POLYNEURITIS

Vitamin B₁, also designated thiamin or thiamin chloride, has been isolated, its chemical structure determined, and it has been synthesized. The vitamin is of importance in the normal dietary of growing and adult dogs. The neuromuscular condition described as polyneuritis is the only

known disease caused by a lack of this factor in the dietary and cured by its administration (table II, section I).

The vitamin, when combined with phosphoric acid, forms the coenzyme cocarboxylase which is necessary for the removal of pyruvic acid, one of the intermediate compounds formed during the utilization of carbohydrates by the animal body.

The first observable symptoms of polyneuritis are inappetence, retarded growth and loss of weight, followed by muscular incoordination and ataxia. The disease may be observed in both growing and adult dogs. The condition occurs less frequently in the cat.

TABLE II—Vitamin B₁.

I. SPECIFIC DISEASES KNOWN TO BE DUE TO LACK OF VITAMIN B₁ AND CURED BY ITS ADMINISTRATION

1) Polyneuritis.

II. CLINICAL CONDITIONS IN DOGS AND CATS IN WHICH VITAMIN B₁ HAS BEEN DEMONSTRATED TO BE OF THERAPEUTIC VALUE

1) Anorexia—caused by feeding a diet subminimum in B₁.

2) Emaciation—growth failure.

III. DISEASES OF DOGS AND CATS FOR WHICH THE CLINICAL USE OF VITAMIN B₁ SHOULD BE GIVEN CONSIDERATION

Diseases of the Nervous System.—1) Toxic posterior paralysis; 2) ataxia with muscular weakness; 3) meningo-encephalitis; and 4) fright disease.

Diseases of the Gastrointestinal Tract.—1) Anorexia; 2) acute enteritis with diarrhea; 3) toxic gastroenteritis, from vermifuge; and 4) chronic enteritis, colitis, atony of colon.

Diseases of the Circulatory System.—1) Cardiovascular lesions; 2) bradycardia; 3) tachycardia; 4) elevated venous pressure; and 5) edema, ascites.

Infectious Contagious Diseases.—1) Canine distemper, for appetite and to prevent depletion through associated diarrhea; and 2) feline gastroenteritis.

The only clinical conditions in which vitamin B₁ has been demonstrated to be of therapeutic value (table II, section II) are anorexia caused by feeding a diet inadequate in this factor and the accompanying growth failure and emaciation. Although these are the only demonstrated therapeutic values of vitamin B₁, it is essential that attention be given to the adequacy of the

diet with regard to other factors of the B complex.

B₁ IN NERVOUS DISEASES

Clinical experience indicates that there are several diseases of dogs and cats for which the clinical use of vitamin B₁ should be given consideration (table II, section III). Of these, diseases of the nervous system are among the most important. Linton¹⁰ suggested the possible relationship of vitamin B₁ to canine hysteria or fright disease and, more recently, Patton¹¹ was successful in producing fright disease with an autoclaved baked dog food, and in curing the symptoms by the administration of copious doses of thiamin hydrochloride (pure crystallized B₁). Watson,¹² however, studied the condition described as fright disease in 50 dogs. He was able to produce the disease using a diet consisting mostly of cereals. Twenty-six of the 50 animals were maintained on this diet and continued to suffer from running fits. The diet of the remaining 24 animals was supplemented with vitamin A, and all were reported to have recovered. Melnick and Cowgill,¹³ on the other hand, produced experimentally typical cases of fright disease in dogs fed high gliadin diets. In studies by Arnold and Elvehjem,¹⁴ in which a baked dog food was employed, vitamin B₁ was without effect in preventing or curing experimentally produced fright disease, canine hysteria, or running fits, so-called in dogs. The condition may be corrected by feeding nutritionally complete proteins, such as purified casein.

In the production of vitamin-B₁-deficient dogs by the authors, for the American Veterinary Medical Association meeting in New York (1938), both adults and puppies were fed the vitamin-B₁-deficient synthetic diet. The usual symptoms described as characteristic of polyneuritis were observed in these animals. After the meeting, the investigation was continued in order to permit further observations. Although close supervision of these animals was maintained over a period of several weeks, symptoms of fright disease were not observed. These reports indicate that there is con-

siderable difference of opinion regarding the cause and treatment of fright disease.

CANINE MENINGO-ENCEPHALITIS

Polyneuritis in the dog must not be confused with canine meningo-encephalitis, an infectious disease usually associated with canine distemper. Vitamin B₁ may be used as an aid in the treatment of these cases. It will not, however, specifically benefit the animal other than to prevent depletion during periods of inappetence.

Another condition in dogs, diagnosed clinically as toxic posterior paralysis, and more commonly observed in adult dogs, does not seem to be associated with a deficiency of this factor. In the treatment of the condition a daily administration of vitamin B₁ does not appreciably shorten the course of the disease.

B₁ IMPORTANT IN GASTROINTESTINAL DISEASES

Vitamin B₁ serves an important function in the treatment of diseases of the gastrointestinal tract, particularly in dogs. Since this substance is water-soluble, depletion of the body tissues is rapid in animals suffering from acute enteritis, with an associated watery diarrhea. Inappetence in such animals may be due in part to a deficiency of this vitamin. It is good practice, therefore, to include in the fluid administration (saline and dextrose) adequate amounts of B₁. The solution may be administered subcutaneously, intraperitoneally, or intravenously. The vitamin is particularly beneficial in the persistent dysentery frequently associated with secondary complications of canine distemper. Clinical experience has shown that in the treatment of acute colic commonly observed in young dogs poisoned with patent worm medicine, the inclusion of vitamin B₁ as a supplementary administration is beneficial. Such patients have frequently been fed inadequate diets prior to receiving the overdose of the drugs and, consequently, there may be a low-grade neuromuscular involvement of the gastrointestinal tract.

This vitamin is also of value in the treatment of gastroenteritis of cats in that it

maintains the store of the factor which would otherwise be depleted by the profuse diarrhea. It does not, however, have any specific action against the infection causing the disease.

In aged dogs it is not uncommon to observe a low grade chronic enteritis, or colitis, either with or without atony of the colon. As a supplement to the bland diet, efficacious in the treatment of this disease, an adequate supply of B₁ will aid considerably in correcting the muscular tone of the bowel.

B₁ MAY HAVE SUPPLEMENTARY VALUE IN TREATMENT OF CIRCULATORY DISTURBANCES

Diseases of the heart and circulatory organs of dogs have not been well defined. They occur, but are not understood as in man. Certain of the symptoms of dogs which were previously assigned to cardiac disease have more recently been found to be associated with kidney and liver dysfunction, or parasitic infestations. In aged animals, however, showing evidence of circulatory disturbances, and particularly those in which the history indicates that the dog has lived almost exclusively on a muscle-meat diet or prepared dog food of questionable quality, it would be well to consider the use of vitamin B₁ as a supplementary procedure. It should be pointed out that it has no specific effect on either edema or ascites.

Vitamin B₁ is without specific effect in contagious or infectious diseases. It is indicated in the treatment of canine distemper to prevent the loss of appetite which frequently occurs with dehydration and also in feline infectious gastroenteritis.

CONDITION OF PATIENT MUST BE STUDIED TO DETERMINE PROPER DOSAGE

Accurate therapeutic dosages have as yet not been established. It is necessary in each case to consider the condition of the animal and its previous nutritional history. Other conditions which seem to increase an animal's demands are pregnancy and lactation. It is also important to remember that there is an increased demand for vitamin B₁ when the metabolism is greatly in-

creased, as in hyperthyroidism, and forced exercise, as in field dogs and racing greyhounds.

Arnold and Elvehjem¹⁵ have shown that the vitamin B₁ requirement is the same during growth and maintenance when stated in terms of food intake. They have reported the requirements of the normal dog to be approximately 0.36 mg. of thiamin per pound of dry food, or about 0.1 mg. per pound of canned food containing 70 per cent moisture.

For clinical use vitamin B₁ may be prepared in sterile solution so that 1 cc. contains 0.132 mg. (40 I. U.). This solution may be added, if desired, to sterile saline and dextrose for parenteral administration, or it may be given to the dog by mouth with a dropper. Some of the vitamin B₁ (thiamin chloride) products offered for sale to veterinarians are those especially prepared for human administration and may contain much more of the vitamin than is actually required for therapeutic purposes in the treatment of either dogs or cats.

OTHER FACTORS IN THE VITAMIN B COMPLEX

Several factors, along with vitamin B₁, constitute what is known as the vitamin B group or complex. Only those members of the group which have been shown to have a relation to canine nutrition will be discussed. Attention will be given to nicotinic acid, vitamin B₂, or G, also called riboflavin, vitamin B₆, and the filtrate factor. It should be pointed out that little is known regarding the requirements of the cat for these substances (table III, section I).

Following the synthesis of several of these factors, rapid advances have been made in the knowledge concerning them and their functions.

Nicotinic Acid.—At one time vitamin B₂, or G, was known as the anti-pellagra and anti-canine blacktongue factor. However, with the growth of our knowledge concerning the nature of this vitamin it has been shown that it is a yellow-pigment riboflavin, which is not effective in the cure or prevention of either of these diseases. As a result of a further search for the anti-

blacktongue factor, Elvehjem and associates¹⁶ of the University of Wisconsin, in 1937, discovered that nicotinic acid or nicotinic acid amide is specific in curing or preventing blacktongue. Dogs with acute blacktongue developed the disease suddenly and lived but a few days, unless treated promptly with pure nicotinic acid or given in available form a rich, natural source, such as yeast, liver extract, or rice-bran extract.

TABLE III—Other factors in the vitamin B complex.

I. SPECIFIC DISEASES AND CERTAIN PATHOLOGICAL CONDITIONS KNOWN TO BE DUE TO THE LACK OF A FACTOR OF THE VITAMIN B COMPLEX AND CURED BY ITS ADMINISTRATION

Nicotinic Acid.—1) Canine blacktongue.

Riboflavin.—1) Acute fatty degeneration of the liver.

Vitamin B₆.—1) Microcytic hypochromic anemia in growing puppies.

II. CLINICAL CONDITIONS IN DOGS AND CATS IN WHICH A FACTOR IN THE B COMPLEX HAS BEEN DEMONSTRATED TO BE OF THERAPEUTIC VALUE

Nicotinic Acid.—1) Fusospirochetal disease (Vincent's angina in dogs).

III. DISEASES OF DOGS AND CATS FOR WHICH THE CLINICAL USE OF A FACTOR IN THE B COMPLEX SHOULD BE GIVEN CONSIDERATION

Nicotinic Acid.—1) Various forms of stomatitis not specifically diagnosed canine blacktongue; 2) nonspecific gastroenteritis of dogs; and 3) gastrointestinal symptoms associated with canine distemper.

Riboflavin.—1) Lenticular cataract (non-senile); 2) nonspecific dermatitis, particularly of the scrotum, flanks and axillae; and 3) animals showing rapid emaciation with dehydration and a diet history suspected of being deficient in this factor.

Vitamin B₆.—1) Secondary nutritional anemia of puppies.

Filtrate Factor.—1) Uses unknown.

Dogs fed on synthetic diets known to be nicotinic acid-free require approximately 53 days to develop clinical blacktongue, according to Goldberger and Sebrell.¹⁷ Russell and Morris (unpublished data) found that 46 to 56 days were required to produce the clinical cases of blacktongue which were on exhibit at the A.V.M.A. convention in 1938.

The discovery of nicotinic acid and its specificity for canine blacktongue has been directly responsible for the permitting of

a more accurate classification of several diseases common to the gastrointestinal tract of dogs. Hemorrhagic gastroenteritis, mercury poisoning, and kidney dysfunction with an associated uremia are commonly misdiagnosed and called blacktongue. An accurate differential diagnosis, therefore, is very important. An accurate diet history for a period of two or three months should be obtained on all animals showing symptoms of blacktongue. If the diet has consisted largely of bread or cereals, with soup (which, by the way, may be almost anything, since it is an indefinite term), and typical clinical symptoms are in evidence, then blacktongue may be suspected. When first observed, such patients are usually dehydrated and, therefore, require prompt administration of saline, glucose, thiamin chloride and riboflavin. It seems important that thiamin and riboflavin be included as a supplementary procedure in these cases. Twenty-five to 50 mg. of nicotinic acid may also be included with the first dose of fluids. Intravenous or subcutaneous administration is preferable.

If specimens of urine and blood are to be collected for laboratory examination, it is recommended that they be obtained prior to treatment. If this is not possible, allowances should be made when the reports are interpreted. If the disease is accurately diagnosed canine blacktongue, the above treatment should be repeated daily or more often, for two or three days, or until the animal is again able to take nourishment normally. Lesions of the mouth and tongue heal promptly without local treatment but, if desired, simple cleansing with an oxidizing agent may be employed.

The animal should then be fed a diet known to contain an adequate level of nicotinic acid. Arnold and Elvehjem¹⁸ recently suggested that 0.5 mg. of nicotinic acid per Kg. (=2.2 lbs.) of body weight per day is adequate to cure symptoms and restore weight. The protective dosage is probably lower.

Pharmacological studies of the toxicity of nicotinic acid have been reported by Unna,¹⁹ in which as much as 2 Gm. of

sodium nicotine per Kg. daily was administered to dogs for a period of 35 days, with no toxic symptoms. Elvehjem and coworkers²⁰ reported toxic symptoms in dogs when 2 Gm. of pure nicotinic acid was administered per day. The pure acid is nontoxic when given in therapeutic doses of 25 to 100 mg. per day.

Smith, Persons and Harvey²¹ reported the isolation of fusospirochetal organisms from the mouths of dogs suffering from canine blacktongue. Fusospirochetal disease, however, is commonly observed in dogs not suffering from clinical blacktongue. Morris and Franklin²² reported the successful treatment of 20 cases, using nicotinic acid.

Nicotinic acid has been found to have a beneficial effect on low-grade oral lesions. It is suggested that stomatitis, non-specific gastroenteritis of dogs and cats, and certain gastrointestinal symptoms associated with canine distemper may also be benefited by this substance.

Riboflavin.—Dogs fed on a Goldberger and Wheeler blacktongue-producing diet,²³ unsupplemented with riboflavin, may develop a generalized weakness, spasticity, slow respiration and a fall in temperature, and become comatose and die very quickly unless treated promptly with copious doses of riboflavin. At necropsy the gross appearance of the tissues is normal, except for the liver, which shows a yellow, mottled appearance and evidence of a fatty infiltration. In addition, certain indefinite microscopic pathological changes have been reported in nerve tissue. Although riboflavin is specific only for this deficiency, recent studies suggest its possible use in certain clinical conditions affecting dogs (table III, section III.)

In the clinical management of canine blacktongue, polyneuritis or fusospirochetal disease, it seems good practice to administer riboflavin as a supplementary treatment, particularly since the composition of the diet which produces the deficiencies is not accurately known.

Based on studies with other species, the use of riboflavin in nonsenile lenticular cataract, particularly in monkeys, nonpara-

sitic dermatitis of dogs, and in animals showing rapid emaciation may be indicated. Sebrell and Onstott²⁴ have reported that 25 micrograms of riboflavin per Kg. of body weight per day are required by the dog to prevent the deficiency.

György²⁵ has noted that rats maintained on a riboflavin-deficient diet appear more susceptible to pediculosis. It is suggested, therefore, that this disease in dogs, under certain instances, may be correlated with a riboflavin deficiency.

Vitamin B₆.—Fouts, Helmer, Lepkovsky and Jukes²⁶ demonstrated that puppies fed on a synthetic diet supplemented by all the well known factors of the vitamin B complex except B₆ failed to grow normally, and developed a microcytic hypochromic anemia. These findings have been confirmed by workers at the University of Wisconsin. Recently, vitamin B₆ has been synthesized and will no doubt be given a proper chemical designation in the near future.

The clinical importance of B₆ will probably lie in the treatment of microcytic hypochromic anemia in growing puppies. Other anemias of puppies should not be ascribed to a lack of this factor. It will be necessary to differentiate this form of anemia from that commonly associated with hookworm disease, mineral deficiencies, those secondary to certain infectious diseases or other specific causes. Dosage of this factor has as yet not been established.

Filtrate Factor.—Morgan²⁷ of the University of California reported that the lack of a factor known as the filtrate factor is responsible for adrenal atrophy and senescence and is marked by the production of graying of the hair about the mouths of young puppies. The clinical significance of Morgan's observations is as yet not known.

Vitamin D

RICKETS

A lack of vitamin D results in the development of rickets and the vitamin is specific in the cure of this disease. Adequate supplies of calcium and phosphorus are necessary along with vitamin D for normal bone and tooth formation (table IV).

In young, rapidly growing dogs, it is not uncommon to observe a flatfooted, splaytoed, down in the pastern condition, which may be easily misdiagnosed as rickets. This condition is quite frequently observed in young dogs, which for some reason may have been confined in cages. A properly executed radiograph of one of the long bones, preferably the distal end of the radius or ulna, is the only accurate method available for the diagnosis of rickets.

TABLE IV—Vitamin D.

I. SPECIFIC DISEASES KNOWN TO BE DUE TO A LACK OF VITAMIN D AND CURED BY ITS ADMINISTRATION

1) Rickets.

II. DISEASES OF DOGS AND CATS FOR WHICH THE CLINICAL USE OF VITAMIN D SHOULD BE GIVEN CONSIDERATION

1) Diseases of the adult skeleton, such as osteomalacia.

2) Cases where parathyroid dysfunction is suspected.

3) Canine eclampsia.

The administration of vitamin D, in addition to an adequate intake of calcium and phosphorus, constitutes specific treatment for rickets. In treating the large, rapidly growing breeds, such as the Dane, Wolfhound, or St. Bernard, it should be pointed out that the vitamin D requirements seem greater in proportion than in the smaller breeds of dogs.

OTHER DISEASES IN VITAMIN D CATALOG

There are a few diseases of dogs and cats for which the clinical use of vitamin D should be given consideration. Of these, osteomalacia is probably the most important. Vitamin D may also be used, in conjunction with an adequate supply of calcium, in the treatment of canine eclampsia. It may also serve as an adjunct in the treatment of dogs suspected of having a parathyroid dysfunction.

GENERAL CONSIDERATIONS OF THE D FACTOR

The best natural source of vitamin D is sunlight. Fish liver oils and concentrates and irradiated products are satisfactory sources. The vitamin D requirements are quite variable, depending on breed, age,

season of the year, availability of natural sunlight, adequate amounts of calcium and phosphorus and a favorable ratio of these elements. Until more definite information is available, the present practice of advising the use of 1 teaspoonful of good grade cod liver oil, or an equivalent potency of other antirachitic substances, per day for curative or preventive purposes is probably a safe practice.

To overdose a dog with vitamin D may be followed by certain toxic effects. When given in tremendous excess, damage to kidney parenchyma has been observed and pathological calcium deposits occur in the blood-vessel walls, the liver and kidneys.

Although it has long been known that this vitamin is required by the dog, nevertheless it is common to observe rickets in young, growing dogs of the larger breeds.

Vitamin E

Vitamin E has been isolated, its chemical structure determined, and it has been synthesized. The need for this factor by the white rat has been adequately demonstrated. In this species a lack of vitamin E apparently interferes with the normal, rapid proliferation and differentiation of cells in the fetus, and absorption of the fetus occurs. It has been found that goats do not require the factor but studies have not been conducted with any of the other common species. Hence, there is no information as to whether the dog or cat requires vitamin E. Until recently, research concerning this vitamin was conducted with wheat germ oil as the principal source. Now that a pure chemical compound is available, more thorough information can be obtained.

Vitamin K

Since 1936, when Dam²⁸ proposed the designation vitamin K (Koagulations vitamin) for a factor necessary for blood coagulation, a number of studies have been conducted to determine the rôle played by this substance in prothrombin formation and the clotting of blood. Vitamin K is fat-soluble and occurs rather widely in nature. It is found, for example, in pig

and beef liver, fish meal, alfalfa, soybean oil and egg yolk.

Dixon²⁹ has ably described the clinical application in man of vitamin K as follows:

"Four basic factors appear to be necessary in the prevention and control of a deficiency of vitamin K: 1) The presence of bile of normal composition in the intestinal tract; 2) a liver which is physiologically capable of utilizing the vitamin; 3) a diet containing the vitamin itself, or materials from which it can be formed; and 4) a normal absorptive surface in the small intestine.

Reports indicate that vitamin K will soon be available in pure chemical form. It can then be used, if necessary, in the treatment of critical hemorrhage. At present the requirements of the dog are not known.

Fatty Acids

Burr and Burr,³⁰ in 1929, reported a fat-deficiency condition in the white rat. Later,³¹ it was reported that the fatty acids linoleic and linolenic were effective in curing the deficiency.

Attempts have been made to call these acids vitamin F, but this designation has not been recognized by workers in the field of nutrition.

Haigler³² called attention to the importance of certain fat deficiencies and their possible relationship to nonparasitic dermatitis in dogs. In a recent communication Dr. Haigler indicated that a number of these cases will respond when soybean oil, suet, wheat germ oil, or other fat is administered internally with the diet. Some of the oils have been applied locally to the skin. Haigler suggests that in certain cases the addition of unsaturated fatty acids to an otherwise unchanged diet produces a satisfactory response.

One of us (M. L. M.) has observed in certain clinical cases that the dog responds satisfactorily when additional fats are included with the food. This not only applies to skin conditions but to other conditions in which general metabolism is disturbed. The addition of fat to dry, baked dog food frequently enhances its palatability.

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General Comments

None of the factors discussed is specific for growth, reproduction or lactation. In order that these processes may go on normally, each of the factors should be present in the diet in adequate amounts.

The therapeutic use of mixtures represented to furnish in adequate amounts all of the known vitamins and sold as general-use supplements may prove unsatisfactory for clinical use. If the condition under treatment requires an adequate intake of vitamin A, mixed supplements may or may not supply the desired dosage. Should fish liver oil be given to furnish vitamin A, large quantities of vitamin D are also supplied. As previously indicated, this influences calcium and phosphorus metabolism. If given in large, repeated doses, pathological changes may result. On the other hand, in specific disorders, *e.g.*, rickets, only vitamin D is indicated. In conditions which are usually accompanied by anorexia, polyneuritis and blacktongue, for example, caution must be exercised to administer related factors—in these instances, factors of the vitamin B complex.

Knowledge concerning the dog's vitamin requirements and the rôle of the vitamins in this species is accumulating rapidly. As is evident from this paper, little is known concerning the vitamin requirements of the cat. Practicing veterinarians should give consideration to the place of vitamins in diagnosing and treating certain disease conditions and to the necessity for dog and cat dietaries which are adequate in these factors. A thorough understanding of the rôle of the vitamins in animal nutrition, and of the limitations of their use, will enable the veterinarian to make intelligent application of these factors in his practice.

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Treatment of Heartworms in Dogs with Stibsol—A New Drug

By HAROLD P. BROWN,* Ph.D., and JAMES A. AUSTIN,† A.B.

Kansas City, Mo.

MANY DRUGS have been tested for the treatment of heartworms in dogs. Among these should be mentioned sodium antimony tartrate,¹ atoxyl and formalin,² quinine and emetine hydrochloride,³ neostibanol,⁴ Bayer 205, mercury perchloride, Lugol's solution, neosalvarsan, rivanol and serum therapy,⁵ as well as many other compounds of arsenic, antimony and bismuth. None of these have been found effective. Only two drugs, fuadin and filsol, are recognized as effective at the present time. Fuadin is a trivalent antimony compound that has been widely employed. Filsol, a product developed by Hayes, is said to be a double salt of antimony that is compatible with normal blood. The exact chemical formula of the product has not been disclosed.⁸

The most effective treatments of filariasis in dogs are the organic compounds of antimony in which the antimony has a valence of three. Pentavalent antimony compounds are not effective. Inorganic trivalent compounds, such as tartar emetic, have been used but the toxicity definitely limits their employment in practice. The same objection holds for various combinations of antimony tartrate with other tartrates.

STIBSOL A NEW THERAPEUTIC AGENT

The recent introduction of sulfur into the molecule of drugs used in therapy⁷ suggested the possibility of synthesizing one

which would contain both sulfur and antimony as part of its molecule. This led to the development of an organic antimonial, Stibsol, which has proved effective in removing microfilariae from the blood stream and sterilizing or killing the adult female worms in the heart. The drug possesses a sufficiently wide margin of safety for field use.

Chemically, Stibsol is antimonial-3-catechol-thiosalicylic-acid-sodium and contains 30 per cent of antimony. The solution contains approximately 8.5 mg. of trivalent antimony per cc. and is buffered to a pH slightly higher than that of the blood. Stibsol has been used experimentally on 15 dogs which presented varying degrees of infestation and the progress of treatment checked by making quantitative counts of the microfilariae in blood smears.

EXPERIMENTAL TECHNIC

Microfilaria counts were made by diluting 1 cc. of blood drawn from the radial vein with 1 cc. of a 2 per cent solution of sodium citrate and placing 0.01 cc. on a microscopic slide. A cover glass was used to spread the drop into a thin film, and all of the microfilariae in the field were counted under the low-power objective of the microscope. This method can not be considered a strict quantitative method. Yet, it serves as a guide in estimating the extent of infestation and permits evaluation of the efficiency of Stibsol in varying doses. Mundhenk and Green⁹ have recently called attention to the striking similarity of *Dirofilaria immitis* and the esophageal worm (*Spirocerca sanguinolenta*) and have cautioned against confusing these two parasites. This finding has been confirmed in our study of heartworm patients.

STIBSOL DOSAGE SCHEDULE

The following dosages and schedule of

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(Continued from preceding page)

disease produced by the rigid exclusion of fat from the diet. Jour. Biol. Chem., lxxxii (1929), pp. 345-367.

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injections were adopted, based on the body weight of the dog:

Days Treatment Given (Dose in cc.)

Weights	1st	3rd	5th	7th	8th	9th	10th	12th
Under 22 lbs.	.95	0.5	0.5	1.0	1.0	1.5	1.5	1.5
22 to 33 lbs.	1.0	1.0	1.0	1.5	1.5	2.0	2.0	2.0
33 to 44 lbs.	1.5	1.5	1.5	2.0	2.0	2.5	2.5	2.5
44 to 55 lbs.	2.0	2.0	2.0	2.5	2.5	3.5	3.5	3.5
Over 55 lbs.	2.5	2.5	2.5	3.5	3.5	5.0	5.0	5.0

CASE REPORTS

Dog 190, weight 20 lbs., received 150 per cent of the adopted dosage of Stibsol at the rate shown in the table. This animal had an original microfilaria count of 2, which was reduced to zero after all injections had been made. The blood stream was still clear after 180 days, and the animal was discharged as cured.

Dog 537, weight 63 lbs., received 125 per cent of the adopted dosage at the adopted rate. The original count was 20, and after the fourth injection the count was zero. This animal was discharged as cured after a test on the 150th day showed no microfilariae in the blood stream.

Dog 767, weight 43 lbs., received the adopted dosage at the tabulated rate, and the original count of 28 microfilariae was reduced to zero one day following the last injection. The blood stream remained clear 180 days after the treatment was inaugurated.

Dog 769, weight 27 lbs., received the adopted dosage at the scheduled rate. The original count was 43, but this animal died before injections were completed and, upon autopsy, a heavy infestation of dead adult worms was found in the heart.

Dog 186, weight 35 lbs., received the adopted dosage at the scheduled rate. This animal had a count of 8 and the blood stream was not clear at the end of the first course of treatment. Examination revealed that the animal was pregnant. The rapid increase in weight rendered the dosage inadequate. A second series of injections was given soon after whelping and the blood stream was completely cleared of microfilariae.

Dog 202, weight 31 lbs., received the adopted dosage at the scheduled rate. A second series of injections was necessary to

clear the blood stream, and the animal is still under observation.

Dog 89, weight 37½ lbs., received the adopted dosage at the scheduled rate. The original count of 243 was reduced at the end of the first series of injections, but two injections of a second series completely cleared the blood stream. The animal is still under observation.

Dog 263, weight 27 lbs., had an original count of 903. Three days after the first series of injections was completed, the blood stream was negative. The animal is still under observation.

Dog 240, weight 11 lbs., received the adopted dosage at the scheduled rate but died one day after the injections were completed. Blood examination just prior to that indicated that no microfilariae were present. Postmortem examination revealed a large organized clot in the right heart, enmeshed in which were dead adult worms. Extreme congestion of the lungs also was observed.

Dog 93, weight 50 lbs., received the adopted dosage at the scheduled rate. This animal had an original count of 280, and after two series of injections the count was not reduced. Injections of the antimony compound were continued daily and the animal died on the fourth day. Postmortem examination revealed the right heart almost completely closed by dead adult worms which extended even into the lungs. Three pouch-like cysts were observed on the exterior surface of the esophagus. An adult parasite (*S. sanguinolenta*) was found in each cyst and a small opening to the esophagus was observed. It is evident from this finding that we were dealing here with a double infestation and that this accounted for the failure to clear the blood stream.

Dog 40, weight 37½ lbs., received the adopted dosage but at an increased rate. It received daily injections, since we wished to observe the effect of rapid destruction of the microfilariae and also the effect of the antimony compound when given rapidly. The original count of 24 was reduced to zero just previous to the last injection. This animal remained negative for 60 days,

at which time it was returned to the owner.

Dog 188, weight 40 lbs., received the adopted dosage, but in daily injections. The original count of 2 was reduced to zero after the last injection, and the animal remained free from infestation for 200 days, at which time it was discharged as cured.

Dog 187, weight 61 lbs., received the adopted dosage, but the injections were given at three-day intervals. The blood stream cleared completely after the fourth injection and remained thus for 34 days, at which time it was returned to the owner as cured.

Dog 189, weight 62 lbs., received 80 per cent of the adopted dosage at the scheduled rate. The original count of 5 was reduced to zero after the fifth injection, and the blood stream remained thus for 60 days, at which time the animal was discharged as cured.

Dog 86, weight 40 lbs., received 66 per cent of the adopted dosage at the scheduled rate, and it was found that this dose level was not sufficient to clear the blood stream of microfilariae.

SUMMARY OF RESULTS

Dog 190 received 150 per cent of the adopted dosage at the scheduled rate. Dog 537 received 125 per cent of the adopted dosage at the scheduled rate. Dogs 761, 769, 186, 202, 89, 263, 240 and 93 all received the adopted dosage at the scheduled rate. Dog 40 received the dosage, but at an increased rate. Dog 188 received the adopted dosage, but at an increased rate. Dog 187 received the adopted dosage, but at a slower rate. Dog 189 received 80 per cent of the adopted dosage at the scheduled rate. Dog 96 received 66 per cent of the adopted dosage at the scheduled rate.

It will be noted that dogs 202, 89, 263, 240 and 93 were heavily infested while the others had a comparatively light infestation.

RESULTS OF EXPERIMENTAL TREATMENT

The microfilaria count was observed to increase sharply after the second or third injection, fall off somewhat, and rise again

just before the blood stream cleared. These peaks were observed regardless of the severity of the infestation and seemed characteristic of the treatment. It was concluded that the antimony concentration in the tissues or blood stream must rise to a certain level before the destruction of the microfilariae is effected.

The result of the treatments in dog 186 illustrates the effect in a pregnant animal. The microfilariae did not disappear from the blood stream until after whelping, but the injections caused no ill effect. The marked increase in weight of this animal, 39 to 52 pounds, probably accounts for the continued appearance of the parasites in the blood stream.

Three pouch-like cysts were observed on the exterior surface of the esophagus. An adult parasite (*S. sanguinolenta*) was found in each growth, and a small perforation in the esophagus was observed. A large number of adult heartworms was also found in the heart. It is evident that, in this case, the erratic microfilaria count was due to this double infestation.

PRECAUTIONARY FACTORS

Proper consideration should be given to the effect of killing the adult worms in the heart, also the rapid injection of microfilariae in the blood stream, resulting from the injection of potent therapeutic agents, since mechanical pneumonia or embolism may result.⁶ In treating heavily infested cases, small doses with intervals of rest between injections are preferable. This plan allows controlled destruction of the parasites in the blood stream as well as the destruction of the adult worms in the heart without causing undue reactions in the patient. All animals should be free from organic diseases of the heart, kidneys and liver, and a fecal examination for intestinal parasites should be made. Appropriate treatment should be given before injections are instituted. Any evidence of calcium deficiency during the treatment should be corrected.

SUMMARY

A new organic antimonial, Stibsol (anti-

monial-3-catechol-thiosalicylic-acid-sodium), has been developed for the treatment of heartworm infestation (*Dirofilaria immitis*) in dogs. A concentration of this organic antimony compound in the blood stream is necessary before a noticeable destruction of microfilariae is observed.

A characteristic peak in the destruction of the microfilariae was observed after the second or third injection and again just previous to the disappearance of the microfilariae from the peripheral circulation. Heavy as well as light infestations respond to the treatment.

ACKNOWLEDGMENT

The authors thank the veterinary staff of the Jensen-Salsbery Laboratories for making the clinical observations and postmortem findings recorded.

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[*Stibsol is the only organic antimony compound prepared by an American chemist and an American institution. The product was submitted for approval in July to the federal food and drug department with the protocol of tests for efficiency and safety. The department has approved the product for interstate shipment. Reports from practitioners in the southern states indicate that this new drug is even more effective than the German-made preparation marketed under the proprietary name "Fuadin."*]

Sulfanilamide in Tularemia

To the bacillary infections which yield to sulfanilamide treatment one may now add tularemia, the grave human disease contracted from dressing wild rabbits and, obviously, in other ways. The report of

the curative action of this microbicide in tularemia by W. L. Curtis (*Jour. A.M.A.*, July 22, 1939) adds another important infectious disease to its long list of indications. The patient was a middle-aged woman infected by handling dressed rabbits. Although she had been seriously ill for two weeks, all symptoms of tularemia subsided after a treatment of but two days.

Hepatonephritis in Canine Distemper

Acute hepatonephritis is a common complication of canine distemper. The manifestations are icterus and the usual signs of nephritis determined by urinalysis and systemic disorder. Uremia is the dominant feature that gives the disease its terminal physiognomy. The autopsy never fails to reveal degenerative lesions of the liver and kidneys, as well as the usual pulmonary, cardiac and digestive complications. It resembles hemolytic icterus and, especially, piropilasmiasis.

The medicinal treatment of choice comprises dextrose, methenamine, calcium chloride and digitalis. Proteins and fats are withheld and sweetened aliments given abundantly in small, repeated doses. Milk and meat are reserved for the period of convalescence. (*E. Darraspen, R. Florio and M. Meyandi. Des Hépatonéphrites Aiguës dans la Maladie de Carré. Abstract, Recueil de Médecine Vétérinaire, cxv, July, 1939, p. 427.*)

Medical Times avers that the use of aspirin in early adult life leads headlong to coronary disease in later life, but the mechanism of this remote action is not stated.

The high value of sulfapyridine in the treatment of pneumonia of man is a settled question but, since the flora of pneumonic lungs in animals differs from that of man, this fact should not be overestimated in veterinary medicine in the absence of comparable clinical evidence. In man, sulfapyridine produces a marked granulocytopenia which must be watched carefully to keep the dosing below the danger level.

Memoirs of Service with the Allied Riding Teams*

By W. D. ODOU, D.V.M.

Montebello, Calif.

ORDERS were received on June 2, 1919, from the chief surgeon's office, American Expeditionary Forces, to dissolve the Franco-American veterinary liaison office. The last few weeks of service with the mission required not only the regular course of duties but, in addition, numerous outside assignments. The writer was obliged to make inspection tours of the municipal abattoirs of Paris, where approximately 400 horses and mules were being slaughtered daily. The horses were sold over the butcher blocks in the numerous *butcheries chevalines* as steaks and roasts, and many of Uncle Sam's wheel mules were converted into summer sausage.

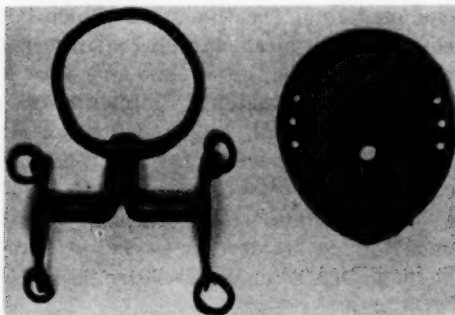


Fig. 1. Left, one of the oldest bits in existence. The rings on the bit fit around the lower jaw. Right, a Hauranian horseshoe.

On June 10, 1919, the writer received orders from Colonel W. O. Johnson to proceed to Fort de Champigny (near Paris) for duty with the allied riding teams. Colonel F. P. Lahm was the officer in charge of the fort. Upon arrival, the writer was assigned as attending veterinarian to the allied riding teams and officer in charge of the stables and the personnel, which comprised Italians, Roumanians, Portuguese, French and Arabians. Lt. Col. Vans Agnew

*By allied riding teams is meant the horses and riders entered in the post-armistice sporting events, sponsored by the American Expeditionary Forces in 1919 at Paris, France.

was assigned in a similar capacity with the United States stable.

The Arabian detachment was a varied and interesting group that required much more attention than all of the others combined. Every part of the desert country was represented. There were tribal chieftains of many tribes, schooled officers who had worked up through the ranks by virtue of their fighting qualities, caretakers, soldiers of fortune, a team of expert swordsmen, slaves, and a Hauranian horseshoer possessing an ancient shoeing kit. The sergeant major (a Syrian from Beirut) of the outfit stated that the horseshoer was a descendant of a family who had followed the art from ancient times, when metal horseshoes were first used. The Hauranian gave the writer a shoe of his own making as a souvenir (fig. 1).

The Arabian animals consisted of 15 purebred Arabian horses, two demi-sengs and three racing camels. The breeding records of the horses were sewn in a triangular piece of goat skin and fastened around the animal's necks with a strongly braided cord of the same material. The pedigree contained the names of the dams for many years back but the names of the sires were not given. The camels were under the care of the slaves, who were men of 30 to 40 years of age. Only one master was allowed to praise or punish them, and they regarded him as the real Allah. They were treated well when their work was satisfactory, were given many privileges, and were allowed to carry a long dagger for defense. Always, however, they seemed to be in doubt as to whether they would be praised or kicked.

The Arabian system of horsemanship differed greatly from the systems of other nations. Immediately upon arrival at Fort de Champigny, after continuous travel by boat and railroad for many days, the horses

were saddled and forced to gallop up and down the road for one-half hour. They believed that the horses' feet soften through a long period of inactivity and employed this means to toughen them. Five of the animals were affected with shipping fever upon arrival. They were placed in isolation, with an American veterinarian in charge. Pneumonia complications developed but only one case terminated fatally.



Fig. 2. Three Arabian captains and one American captain at Fort de Champigny. Standing (left to right), Lebib Nejet el Izzi and Khalad el Hain; seated (left to right), William D. Odou and Tassin el Arkeri.

On the practice field, all mounts except the desert horses were warmed up gradually. As soon as an Arab had saddled his horse, however, he was off to a brisk gallop and did not tighten the reins until he returned to the stable. The Arabian stallions were high spirited and vicious fighters. They were tied to mangers in the stable with halters of braided camel hair and their feet were anchored to the ground with chains 3 to 4 feet in length and secured to the ground with iron stake pins. The number of feet that were anchored depended upon the individual animal; if it was necessary to chain only one foot, it was always a hind one.

The most highly prized stallion was a sorrel with stocking legs which weighed about 1,100 pounds. It was reported that the British government had offered 6,000 pounds for him, and had been refused.

As fond remembrances of his service

with the allied riding teams, the writer has many souvenirs. To name but a few: A hand-made silver inlaid tray that was pounded out with crude implements on the desert by a Bedouin tribesman; a pair of bridle reins made of woven camel hair; a head stall made of Bokhara sheep wool; and, the most highly regarded possession, a bridle bit that is said to be one of the oldest in existence. The authenticity of its origin is founded on the claim of the donor, a tribal chieftain, who stated that it had been handed down through many generations of his family. The metal from which the bit was made had been obtained from iron fasteners of the alabaster decorations on a Roman coliseum. It is claimed that the bit was in service during the seventh crusade.

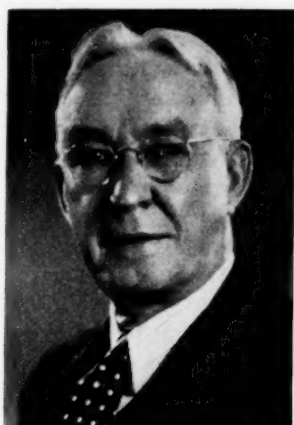
Munitions of War

Tops in munitions of war are bread, cornpone and bacon, and, yet, for political buncombe only things that explode are named in the embargoes. And, what good is the exploder without his cigarettes?

With the sea wide open to the farm products of this hemisphere, the belligerents on the receiving end will win this war. Mules and horses and food are the real munitions of war. Without them the potentiality of the ammunition dump runs around zero.

Sir Walter Scott, the eminent novelist, observed that in the English language the names of live cattle, such as sheep, ox, calf, hog and pig, are of Saxon origin; while the names of the meats, such as mutton, beef, veal, bacon and pork, are of Norman-French origin. From this evidence he argued that "the Normans were the lords who ate the meat, while the Saxons were the serfs who tended the cattle."—*American Weekly*.

Greer Williams is quoted in *The Commentator* as saying, "Is the government's national syphilis program just another government racket?" That's what some folks called bovine tuberculosis eradication not so many years ago.



N. S. Mayo
Education

Committee Chairmen



Left, H. C. H. Kernkamp—Nomenclature
of Diseases and Vital Statistics; right, J. G.
Hardenbergh—Food Hygiene.



C. R. Donham
Bang's Disease



A. E. Wight
Tuberculosis



Left, T. A. Sigler—Representative to the
Horse and Mule Association of America;
right, H. E. Biester—Representative to the
National Research Council.



D. M. Campbell
Public Relations



Left, Ward Giltner—Representative to the American Association for the Advancement of Science; center,
B. T. Simms—Policy; right, J. R. Beach—Poultry Diseases.

COMMITTEE REPORTS

Education

N. S. MAYO, Chairman

THE PAST YEAR there were approximately 2,770 students entering the veterinary colleges of the United States and Canada, including 590 pre-veterinary students. This is an increase of 196 over the previous year. The number of senior students as reported in the fall of 1938 was 515. Of this number, 395 graduated from schools in the United States. This compares with approximately 359 graduates last year. The two Canadian colleges graduated 74. There were about 130 deaths of veterinarians reported in the veterinary journals. The number of veterinarians who retired from practice is not known. It is probable that the mortality will be higher in the next four years, since an unusually large number entered the profession about 25 years ago.

During the past year the Committee has suggested to the authorities having charge of state board examinations that the term "recognized veterinary college" should read "a college recognized by the American Veterinary Medical Association." The Committee also asked if there is a lack of veterinary service for the livestock industry in the various states. All who replied advised that the states are fairly well supplied with veterinarians.

During the year two veterinary colleges have been visited. The veterinary division of the Alabama Polytechnic Institute was visited by the chairman, and the veterinary college of Middlesex University by Drs. Hallman and Hagan.

In at least two of the colleges of the United States, some of the veterinary faculty are engaged in private practice in addition to their college work. Such an arrangement is likely to cause jealousy of those not so forward and to cause criticism by private practitioners in that locality. One veterinary

college has an unusual and impractical organization that includes two deans. This arrangement is not conducive to the best results.

MIDDLESEX'S VETERINARY SCHOOL NOT APPROVED

Middlesex University operates under a charter from the State of Massachusetts. For many years it has operated a school of arts and sciences, of medicine, of pharmacy, and of pediatry. The work in arts and sciences and the basic work in the other fields is given at Waltham. The clinical work in medicine and the work in pharmacy and pediatry is given at Boston. The opening of a school of veterinary medicine at Waltham was announced in 1937. In the fall of that year a class of pre-veterinary students was accepted; in the fall of 1938 the work of the freshman year in veterinary medicine was begun. At the time of inspection by this committee, therefore, the school was offering only the first year of veterinary medicine to a class of 21 students.

The University authorities had not invited this committee to visit the veterinary college but, since there were a number of inquiries from prospective students asking if the school is recognized by our association, it was deemed advisable to make an inspection. This was done on March 3, 1939, by Drs. Hagan and Hallman.

On the basis of its findings, the Committee on Education recommends that the School of Veterinary Medicine of Middlesex University be not approved. The principal reasons are as follows:

The institution appears to be inadequately financed. They did not show to the satisfaction of the Committee that the college

has any operating resources other than the fees of its students.

At the time of the sub-committee's visit, practically no special provision in physical facilities had been made for the teaching of veterinary students. Since the time of our visit, we have been informed by the dean that the construction of a veterinary hospital has been started.

The veterinary faculty is inadequate both in number and experience. There were but two active graduate veterinarians on the staff at the time of the Committee's visit, and one of these was on a part-time basis. One of these veterinarians is a 1937 graduate and the other a 1938 graduate. The competency of such inexperienced men as senior faculty members is questioned.

The library facilities are wholly inadequate.

Dr. Hallman of this committee has collected and summarized data on the average student clock-hour load per full-time man on the staffs of the American veterinary colleges. The term "full-time man" heading the first column of the chart giving the student clock-hour table represents the equivalent of full-time academic men calculated on the individual reports of the division of their time between academic, research, and other activities; that is, there may be more than the number of full-time men on the department staff, some of whom are devoting only part time to academic work. This data should be of value to all teachers on the veterinary college staffs.

Average student clock-hour load per full-time man.

STATES	ANATOMY		PHYSIOLOGY AND PHARMACOLOGY		BACTERI- OLOGY		PATHOLOGY		CLINICAL MEDICINE		AMBULA- TORY CLINIC	COM- MENTS
	FULL-TIME MEN ON STAFF	AV. CLOCK- HOUR LOAD	FULL-TIME MEN ON STAFF	AV. CLOCK- HOUR LOAD	FULL-TIME MEN ON STAFF	AV. CLOCK- HOUR LOAD	FULL-TIME MEN ON STAFF	AV. CLOCK- HOUR LOAD	FULL-TIME MEN ON STAFF	AV. CLOCK- HOUR LOAD	FULL-TIME MEN ON STAFF	
Alabama	1.50	583	1.00	251	1.90	252	1.42	249	3.17	296		
Colorado	1.00	356	1.40	440	1.55	253			2.60	336		Path. and Bacty. combined
Iowa	4.43	154	1.80	461			2.70	1.72	6.10	2.86	1.00	
Kansas	4.55	190			.50	472	2.87	463	3.95	390		Anat. and Phys. combined
Michigan	4.00	202	2.00	220	3.56	425	2.54	219	3.50	232		
New York	1.50	356	2.20	320	4.63	164			5.50	273	1.08	Path and Bacty. combined
Ohio	2.75	299	1.57	532	.67	374	4.08	246	6.47	511		
Ontario	6.75	737	No departmental organization. Clock-hour-load figures for whole school									
Pennsylvania	3.00	297	1.00	321	.48	471	2.50	135	7.35	145		
Quebec	3.62	168	No departmental organization. Clock-hour-load figures for whole school									
Texas	3.00	289	4.00	232			2.75	237	4.25	258		
Washington	1.00	493	1.00	1082	.50	378	.67	374	3.25	232		

Academic rank of staff members.

INSTITUTION	TOTAL NO. OF PERSONS ON STAFF	PROFESSOR		ASSOC. PROF.		ASST. PROF.		INSTRUCTOR OR FULL-TIME ASST.	
		PER CENT OF TOTAL	AV. NO. OF YEARS TEACHING	PER CENT	AVERAGE	PER CENT	AVERAGE	PER CENT	AVERAGE
Alabama	10	6 60	62 10.3	0 0	0	3 30	11 3.7	1 10	2 2.0
Colorado	12	5 41.7	132 26.4	0 0	0	6 50	33 5.5	1 8.3	8 8.3
Iowa	22	7 31.8	164 23.4	7 31.8	58 8.3	6 27.3	36 6.0	2 9.1	4 2
Kansas	18	9 50.0	190 21.1	2 11.1	18 9.0	2 11.1	14 7.0	5 27.8	12 2.4
Michigan	23	6 26.1	144 24.0	2 8.7	45 22.5	6 26.1	103 17.2	9 39.1	40 4.6
Ohio	21	10 47.6	264 26.4	0 0	0	2 9.5	25 12.5	9 42.9	34 3.8
Ontario	11	2 18.2	56 28	0 0	0	0 0	0 0	9 81.8	120 13.3
New York	30	12 40.0	303 25.3	0 0	0	6 20.0	72 12.0	12 40.0	46 3.8
Pennsylvania	31	10 32.3	269 26.9	1 3.2	9 9	6 19.4	132 22.0	14 45.1	92 6.5
Quebec	8	5 62.5	62 12.4	0 0	0	0 0	0 0	3 37.5	16 5.3
Texas	14	7 50.0	113 16.1	0 0	0	2 14.3	4 2	5 35.7	10 2
Washington	8	1 12.5	30 30	2 25	20 10	3 37.5	19 6.3	2 25	2 1

Upper figures=Totals. Lower Figures=Per cent and averages.

Publications during past ten years.

INSTITUTION	NO. OF STAFF WRITING	PERCENTAGE OF STAFF	TOTAL NO. OF PUBLICATIONS	AV. BY THOSE WRITING	AV. WHOLE STAFF
Alabama	6	60.0	24	4.0	2.4
Colorado	10	83.3	114	11.4	9.5
Iowa	16	72.7	199	12.4	9.0
Kansas	15	83.3	89	5.9	4.9
Michigan	13	56.5	157	12.1	6.8
Ohio	16	76.2	110	7.6	5.2
Ontario	4	36.4	12	3.0	1.1
New York	25	83.3	228	9.1	7.6
Pennsylvania	23	74.2	164	7.1	5.3
Quebec	3	37.5	12	4.0	1.5
Texas	3	21.4	10	3.3	.7
Washington	6	75.0	40	6.7	5.0

Graduate degrees of staff.

INSTITUTION	PROFESSOR			ASSOC. PROFESSOR			ASST. PROFESSOR			INSTRUCTOR OR FULL-TIME ASST.		
	No.	M. S.	Ph. D.	No.	M. S.	Ph. D.	No.	M. S.	Ph. D.	No.	M. S.	Ph. D.
Alabama	6	2	1	0	0	0	3	0	0	1	1	0
Colorado	5	1	0	0	0	0	6	2	0	1	1	1
Iowa	7	0	0	7	6	4	6	2	0	2	2	0
Kansas	9	5	1	2	2	0	2	1	0	5	2	0
Michigan	6	4	3	2	0	0	6	5	2	9	3	1
Ohio	10	3	0	0	0	0	2	1	1	9	6	0
Ontario	2	1	0	0	0	0	0	0	0	9	2	0
New York	12	10	4	0	0	0	6	5	3	12	6	2
Pennsylvania	10	5	3	1	1	1	6	5	4	14	7	4
Quebec	5	2	0	0	0	0	0	0	0	3	0	0
Texas	7	1	0	0	0	0	2	1	0	5	0	0
Washington	1	0	0	2	1	1	3	2	0	2	0	0

Professional meetings participated in past five years.

INSTITUTION	NATIONAL AND INTERNATIONAL					STATE AND COUNTY				
	No. OF STAFF PART.	PER CENT OF STAFF	TOTAL No. OF MEET.	AV. BY THOSE WHO PART.	AV. WHOLE STAFF	No. OF STAFF PART.	PER CENT OF STAFF	TOTAL No. OF MEET.	AV. BY THOSE WHO PART.	AV. WHOLE STAFF
Alabama	2	20.	7	3.5	7	9	90.	39	4.3	3.9
Colorado	5	41.7	9	1.8	7.5	8	66.7	33	4.1	2.8
Iowa	12	54.5	33	1.9	1.5	18	81.8	92	5.1	4.2
Kansas	9	50.	24	2.7	1.3	12	66.7	39	3.3	2.2
Michigan	9	39.1	24	2.6	1.0	12	52.2	42	3.5	1.8
Ohio	12	57.1	37	3.1	1.8	12	57.1	64	5.3	3.0
Ontario	5	45.5	12	2.4	1.1	10	90.9	51	5.1	4.6
New York	17	56.7	37	2.2	1.2	23	76.7	110	4.8	3.7
Pennsylvania	14	45.2	38	2.7	1.2	15	48.4	66	4.4	2.1
Quebec	1	12.5	1	1.0	.1	4	50.	5	1.3	.6
Texas	4	28.6	4	1.0	.3	8	57.1	23	2.9	1.6
Washington	4	50.	12	3.0	1.5	5	62.5	19	3.8	2.4

Professional meetings attended past five years.

INSTITUTION	NATIONAL AND INTERNATIONAL					STATE AND COUNTY				
	No. OF STAFF ATTEND.	PER CENT OF STAFF	TOTAL No. OF MEET.	AV. BY THOSE WHO ATTEND.	AV. WHOLE STAFF	No. OF STAFF ATTEND.	PER CENT OF STAFF	TOTAL No. OF MEET.	AV. BY THOSE WHO ATTEND.	AV. WHOLE STAFF
Alabama	10	100	45	4.5	4.5	10	100	54	5.4	5.4
Colorado	9	75	30	3.3	2.5	11	91.7	77	7.0	6.4
Iowa	18	81.8	91	5.1	4.1	20	90.9	161	8.1	7.3
Kansas	15	83.3	58	3.9	3.2	18	100	110	6.1	6.1
Michigan	12	52.2	74	6.2	3.2	16	69.6	123	7.7	5.3
Ohio	19	90.5	110	5.8	5.2	20	95.2	169	8.5	8.0
Ontario	8	72.7	27	3.4	2.5	11	100	99	9.0	9.0
New York	23	76.7	125	5.4	4.2	28	93.3	276	9.9	9.2
Pennsylvania	24	77.4	106	4.4	3.4	24	77.4	272	11.3	8.8
Quebec	5	62.5	14	2.8	1.8	6	75.0	23	3.8	2.9
Texas	10	71.4	26	2.6	1.9	13	92.9	58	5.4	4.1
Washington	5	62.5	24	4.8	3.0	7	87.5	69	9.9	8.6

At the request of this committee, Dean Dykstra kindly consented to collect data on the number of applicants who were not admitted to veterinary colleges in the United States. He reported as follows:

Reports were received from eight of the ten veterinary schools of the United States. One of these eight reports was so out of line with the others that it was impossible to interpret it on the basis of the other seven. Hence, this report deals only with seven veterinary colleges in the United States.

The reports from the deans indicate that the seven American colleges accepted 373 qualified applicants and rejected 665. By qualified applicants I mean those students who had completed all of the necessary high school and pre-veterinary requirements with grades and other qualifications indicating not only that they were ready to pursue the curriculum in veterinary medicine but also that they were otherwise favorably adapted.

An analysis of the 665 rejections indicates that approximately one-fourth of these applicants had applied for admission to more than one veterinary college. Subtracting the one-fourth from the total of 665 leaves 521 rejections. It is interesting, in regard to the 521 rejections, that 342 of them were issued in two of the seven colleges located in the most densely populated portion of the United States. In other words, five of the veterinary colleges—those not in the most densely settled portions of the United States—have only the difference between 521 and 342 rejections, leaving 179 rejections for five of the schools.

In the preceding paragraphs, I have discussed only those applicants who, scholastically and otherwise, are fully qualified to be admitted to the four-year curriculum in veterinary medicine. All of the institutions reported on indicate that, in addition to these, they have an unusually large number of "inquiries." In view of the fact that the inquiries did not develop into formal applications, it leads to the assumption that the inquirer could not meet the standard. I am convinced that it is this large number of inquirers that leads to the impression that the veterinary colleges are refusing admission to "hundreds" of applicants. The facts are that only comparatively few fully qualified applicants are refused admission.

The veterinary colleges of the United States are of course compelled to resort to limitation of enrollment because of a lack of physical equipment and limited numbers

of faculty members. The legislatures of the ten states in question are not inclined to increase appropriations for veterinary education as long as they can take care of the residents of their own states.

Experience also convinces me that many applicants are not fundamentally interested in the profession of veterinary medicine. They desire to be entered simply to exploit it, and because they are convinced that with the healthy situation in the profession, it offers more than the usual financial returns.

I feel that in a measure this limitation of enrollment is a fortunate situation for the American veterinary profession in that it leaves us in a sound situation, while if there were unlimited opportunities to enroll, we would soon be swamped with excessive numbers. Only the deans of the colleges who each year must meet the problem of finding desirable locations for their graduates can realize how serious the situation would be if there were virtually unlimited numbers of graduates. I know that I speak for the colleges when I ask that the profession as a whole support this program. Undoubtedly, the limitation works a hardship on an occasional individual but the profession as a whole is benefited by it.

The Committee recommends that the graduates of the following veterinary colleges be approved for membership in the Association:

- 1) Alabama Polytechnic Institute, Division of Veterinary Medicine;
- 2) Colorado State College, Division of Veterinary Medicine;
- 3) École de Médecine Vétérinaire de la Province de Québec, Université de Montréal;
- 4) Iowa State College, Division of Veterinary Medicine;
- 5) Kansas State College, Division of Veterinary Medicine;
- 6) Michigan State College, Division of Veterinary Medicine;
- 7) New York State Veterinary College, Cornell University;
- 8) Ohio State University, College of Veterinary Medicine;
- 9) Ontario Veterinary College, University of Toronto;
- 10) University of Pennsylvania, School of Veterinary Medicine;
- 11) Texas Agricultural and Mechanical College, School of Veterinary Medicine;

12) State College of Washington, College of Veterinary Medicine.

Since all of the veterinary colleges are making improvements in buildings, equipment, and instruction staffs as rapidly as they are financially able, the Committee recommends that no classification of veterinary colleges be made this year.

Respectfully submitted,
(Signed) N. S. MAYO, *Chairman*.
E. T. HALLMAN,
C. D. MCGILVRAY,
W. A. HAGAN,
P. L. CADY.

History

IF THE PRECISE duty of this committee has been somewhere or somewhen defined, we have been unable to locate the documentation. Our immediate predecessors have written valuable information into the records from time to time. The reports have touched mainly upon the personnel of the profession since veterinary schools were founded in this country. What this personnel has done has not been tabulated in the Association's archives, nor has any effort been made to compile a biography of even our most distinguished members. History is either a record of more or less important events set down in chronological order, or else a biography of those who participated in them. As a rule, a good history is an admixture of both.

The work of this committee, however, is not without great value. Authors of the future who undertake the difficult task of weaving the loose ends of our legendary past into the facts set down since we have had a sustained periodical literature will find the reports of this committee of considerable value. They will aid materially in writing the history of veterinary science in this country which, needless to declare, has never been undertaken by the Association. This committee was undoubtedly created through the vague, though sensible, idea that such a book should be written. No one, however, was ever delegated to recommend even the protocol for such a book. Consequently, the Committee's reports have

been sketchy and do not represent a definite amount of finished work year by year.

Besides the extremely excellent history of the Bureau of Animal Industry, United States Department of Agriculture, by U. G. Houck and associates, *Veterinary Military History of the United States*, which the Association charitably subsidized, and *25th Anniversary Souvenir Book* of the Eastern Iowa Veterinary Association, the history of the veterinary profession in this country is a dark chapter. While each of these three books was written for a definite purpose, they all contain nuclei of great value for those who set out to write a real veterinary history of our country.

The writing of *Veterinary Military History of the United States* was undertaken for the definite purpose of recording the American veterinarian's participation in the World War. Members of our profession participated in all of our nation's military conflicts from General Washington to General Pershing, but one would seek in vain through official documents for a true record of what they accomplished. With accurate accounts of what veterinarians did in the World War fresh and available, it was deemed a duty by the authors and the Association to place them permanently on record. This committee feels obligated to compliment the veterinarians of eastern Iowa for having put on record the details of what veterinarians in civil life have done in that part of the country during the past 25 years.

We suggest that some degree of coöperation or affiliation be established between this committee and the new committee on vital statistics and nomenclature in order that the reports of the two may become a real chronological story of events from which the future historian may sort the material for his literary task.

We recommend that the work that this committee is expected to do be precisely defined and plans laid to carry it out.

(Signed) L. A. MERILLAT, *Chairman*.

R. R. DYKSTRA,
LEONARD W. GOSS,
C. M. HARING,
GEO. H. GLOVER.

Public Relations

D. M. CAMPBELL, Chairman

THIS COMMITTEE has continued the lines of work described last year at the New York meeting and in previous reports, and has inaugurated one new project, which will be discussed in detail later.

Some of the work has increased materially, particularly the part having to do with correction of what members deem misleading reports or statements derogatory to the profession appearing in the public press or broadcast over the radio.

Perhaps as a result of earlier correspondence, the Committee was given an opportunity this year to supply information concerning veterinary medicine and the veterinary profession to a scenario writer of Metro-Goldwyn-Mayer pictures. Naturally, we do not know what the outcome will be, but the studio representative assures us that the picture will "glorify the work and life of a veterinarian."

PUBLICITY FOR STATE VETERINARY MEETINGS

Coöperation with the secretaries and public relations committees of state and district veterinary associations has been largely extended by the member of the Committee having that work in charge (J. D. R.). Reprints of that portion of our report of last year embracing suggestions and plans for publicity at state and district veterinary meetings have been requested by the majority of such associations and supplied to them. The results have been excellent, as far as newspaper publicity is concerned, but we think that these associations are not yet making the most profitable use, during their annual meetings, of opportunities for radio broadcasting and supplying speakers for local business organization meetings. As far as this committee is aware, J. B. Hollenbeck, chairman of the Committee on Public Relations of the Ohio State Veterinary Medical Association, achieved the most among the state associations in this kind of work during the past

year, and W. T. Hufnall, secretary of the Houston Veterinary Association, was the most successful among the local associations. Among the district associations, the Eastern Iowa Veterinary Association, as usual, led all the rest in the number of news stories and editorials published concerning its meetings.

PUBLICITY FOR VETERINARY ACHIEVEMENT

The single veterinary contribution during the year that received the greatest publicity was the discovery of the cause of fright disease in dogs by J. W. Patton. That received a circulation of many millions in newspapers and was told in several magazines of general circulation, in the dog press and in science magazines. It was discussed in several of the syndicated medical columns of daily papers. The popular interest in the subject is attested by a great volume of inquiries received by Dr. Patton. In no instance that came to our attention was there a failure to mention that the discovery was made by a veterinarian.

INFORMATION FOR MEDICAL STUDENTS

The plan of having a veterinarian address the senior class in each of the medical schools was not carried out this year to the extent that it was last year. While the deans of most of the medical schools favor this, the Committee experienced considerable difficulty in arranging for speakers at a time when the deans could arrange for these lectures. The member of the Committee having this in charge (C. F. S.) is of the opinion that while this is a valuable means of better acquainting the medical profession with the work of veterinarians, we should continue the plan only on the following conditions:

- 1) That speakers can be engaged for the work who will definitely agree to give these lectures at the same schools, at the time arranged, year after year;

2) that speakers prepare their lectures an ample time in advance of delivery to submit them to this committee for approval or revision before delivery; and

3) that we undertake the work only in schools where a place for this lecture is definitely arranged in the curriculum.

There are obvious difficulties in this plan, but it seems necessary to surmount them in order to carry it out, and the Committee will be glad to receive applications from veterinarians who are inclined to undertake this task, under these conditions, at medical schools of their own selection. Unless our members exhibit a greater willingness to carry on this work, it must be discontinued since, obviously, members of this committee can not carry it out themselves. The cost of travel would be prohibitive even if the sacrifice of time did not preclude it.

POULTRY CONTINUATION SCHOOLS

One member of the committee (E. C. W. S.) has taken an active part in the continuation schools in poultry diseases for veterinarians recently established in Michigan, and is enthusiastic concerning the value of these schools.

VETERINARY EXTENSION SERVICE

In two of our preceding reports we have mentioned the importance, in the view of the Committee, of the veterinary extension service now established as a part of agricultural extension in the majority of the states. Our study of veterinary extension service is not yet complete and we are not prepared to make any recommendations concerning it at this time. However, preliminary to a study of this matter, one member of the Committee (K. G. M.) has prepared an excellent history of agricultural extension service in this country over more than 150 years and an accurate description of its present makeup and functioning. Since the matter so intimately concerns the relations of our members with the public, we believe it important that they, too, have available this history of agricultural extension service in general and we include it in this report for study and for reference.

HISTORY OF AGRICULTURAL EXTENSION

Agricultural extension work has passed through several stages of development covering more than a century and a half. It had its beginning in the organization of the Philadelphia Agricultural Society in 1785. This and similar societies were formed to acquaint their members with what was being done to improve agriculture. But, they also had among their objectives to bring about local agricultural organization and to disseminate agricultural information through their publications, newspaper articles, and lectures.

The agricultural societies prevailed for 67 years, dating from 1785 to 1852. For the next 27 years, to 1879, farmers' institutes were the *modus operandi* of the day. Professors representing different branches of agriculture were assigned and rotated to districts to visit farms, institute experiments, advise farmers, give lectures, and hold meetings.

The Massachusetts board of agriculture on January 21, 1858, appointed a committee "to consider and report the propriety of instituting meetings similar to teachers' institutes, for the discussion of agricultural topics." The committee reported on February 2, 1858, that "Public meetings under the direction and control of the board of agriculture will best subserve this purpose." Let the board assemble the farmers, bring them face to face with the science of agriculture, induce them to take an active part in the discussions and investigations.

In 1859, the Massachusetts board of agriculture published and distributed information in the form of tracts on manures, renovation of pastures, grain crops, root crops, fruits, fencing, cattle husbandry, sheep, horses, diseases of vegetation, and market fairs. In 1860, 40,000 copies of a circular on the culture of grasses were printed for distribution to teachers, "to be read publicly in schools, and loaned out from week to week to be read in families in the farming districts."

Between 1880 and 1890, farmers' institutes or equivalent public meetings were established on a more or less permanent basis in 26 states through the development of state aid.

Early in the 1900's the work connected with the farmers' institutes and other forms of agricultural extension work in which the land-grant colleges participated, increased so rapidly in extent and variety that these institutions had great difficulty in meeting the demands on them in this direction without impairing their resident teaching and researches. A demand therefore arose for federal appropriations for extension work, partly to stimulate increased state appropriations for this purpose.

Before 1914, 40 of the state colleges had extension departments, Rutgers claiming first honors in 1891. Short courses and farmers' weeks at the colleges appeared as part of our rural culture. Movable schools, extension schools, and agricultural trains became common, and the agricultural extension departments rapidly expanded, with even nonrural groups participating in agricultural courses. In that year the funds expended for extension work aggregated almost \$1,000,000.

TABLE I—Percentage of agents' and specialists' time devoted to projects.

ITEM	1934	1935	1936	1937	1938
Farm crops	28.7	29.9	18.6	16.2	15.9
Horticulture	7.4	7.6	7.4	7.7	7.2
Forestry	0.5	0.7	0.8	1.0	1.0
*Animal husbandry	11.6	9.0	7.0	7.4	7.6
*Dairy husbandry	3.7	3.6	3.4	4.2	4.0
*Poultry husbandry	3.3	3.5	4.0	4.0	4.0
Agricultural engineering	1.6	3.0	4.4	4.7	4.4
Rodents and insects	1.4	0.9	1.0	1.7	1.7
Agricultural economics	8.2	7.4	13.7	8.7	7.9
Foods and nutrition	7.8	7.3	7.0	7.2	6.8
Child development and parent education	0.6	0.6	0.7	0.7	0.8
Clothing	5.6	5.6	5.8	6.0	5.8
Home management	1.4	1.6	1.8	2.1	2.1
House furnishings	2.1	2.4	2.9	3.3	3.4
Home health and sanitation	1.0	1.0	0.9	1.1	1.0
Community activities		3.4	4.4	5.9	5.6
Formulation of the extension program	15.1	8.0	10.9	13.4	15.2
Miscellaneous		4.5	5.3	4.7	5.6

*Less than 16 per cent of extension agents' time is spent in livestock activity, including poultry.

May 8, 1914, the Smith Lever Act provided:

... that in order to aid in diffusing among the people of the United States useful and practical information on subjects relating to agriculture and home economics, and to encourage the application of the same, there may be inaugurated in connection with the college or colleges in each state now receiving, or which may hereafter receive the benefits of the land grant act of 1862 and the Morrill college endowment act of 1890, agricultural extension work which shall be carried on in co-operation with the United States Department of Agriculture.

That cooperative agricultural extension work shall consist of the giving of instruction and practical demonstrations in agriculture and home economics to persons not attending or

resident in said colleges in the several communities, and imparting to such persons information on said subjects through field demonstrations, publications, and otherwise; and this work shall be carried on in such manner as may be mutually agreed upon by the Secretary of Agriculture and the state agricultural college or colleges receiving the benefits of this act.

Each state is to receive \$10,000 of federal funds annually, and additional amounts on the basis of its rural population, from a fund of \$600,000 at first, increasing by \$500,000 annually for seven years and thereafter continuing at a total of \$4,100,000. These additional amounts of federal funds must be offset by appropriations by the state legislature or by contributions provided by state, county, college, local authority, or individual contributions from within the state.

TABLE II—Summary of results in livestock activity—1938.

	DAIRY CATTLE	BEEF CATTLE	SHEEP	SWINE	HORSES AND MULES	OTHER LIVE STOCK
Farmers assisted in obtaining purebred sires	16,430	15,885	14,715	21,041	2,536	584
Farmers assisted in obtaining high-grade or purebred females	18,768	10,097	11,334	21,202	3,901	526
Bull, boar, ram, or stallion circles organized or assisted	855	241	123	382	239	18
Members in preceding circles	11,409	4,477	1,639	4,708	8,638	331
Herd improvement associations organized or assisted	1,717	186	212	178	76	13
Members in preceding associations	33,951	9,252	13,665	5,994	4,378	335
Farmers not in associations keeping performance records of animals	22,325	2,974	2,301	5,141	1,647	46
Families assisted in home butchering, meat cutting and curing	—	17,156	2,863	42,911	—	376
Families assisted in butter and cheese making	26,341	—	—	—	—	—
Farmers following parasite-control recommendations	37,450	30,243	107,832	106,290	135,601	3,507
Farmers following disease-control recommendations	316,024	111,427	36,356	232,727	92,759	4,797
Farmers following marketing recommendations	73,059	38,519	43,708	101,987	2,472	865
Farmers assisted in using timely economic information as a basis for readjusting enterprise	126,778	68,389	43,626	134,700	26,574	1,053

TABLE III—Summary of activities by agricultural, home-demonstration and club agents—1938.*

GENERAL ACTIVITIES	TOTAL REPORTED FOR ALL LINES OF WORK		REPORTED BY HOME DEMONSTRATION AGENTS		REPORTED BY CLUB AGENTS†		REPORTED BY COUNTY AGRICULTURAL AGENTS	
	NUMBER	COUNTIES REPORTING	NUMBER	COUNTIES REPORTING	NUMBER	COUNTIES REPORTING	NUMBER	COUNTIES REPORTING
Number of 4-H judging teams trained	41,552	2,184	21,834	876	2,585	368	17,557	1,686
Number of 4-H demonstration teams trained	57,255	2,083	31,485	1,126	5,375	318	21,991	1,353
Groups organized for extension work with rural young people above club age	2,036	977	1,000	511	183	121	1,380	730
Membership in such groups	67,586	893	31,080	509	8,230	115	43,343	721
Number of farm or home visits made	2,973,667	2,960	705,408	1,891	251,719	496	2,024,206	2,943
Number of different farms or homes visited	1,587,469	2,960	403,188	1,891	134,781	496	1,091,129	2,943
Number of office calls	22,123,152	2,961	1,191,170	1,880	263,903	469	20,695,320	2,948
Number of telephone calls	6,644,664	2,934	1,036,074	1,845	188,888	460	5,419,702	2,902
Number of news articles published	781,685	2,950	249,524	1,874	42,047	477	492,804	2,926
Number of individual letters written	8,701,984	2,957	1,697,014	1,862	312,374	484	6,592,816	2,944
Number of different circular letters prepared	463,018	2,956	137,105	1,854	29,006	472	301,348	2,937
Number of bulletins distributed	13,998,138	2,953	5,558,980	1,875	611,669	464	7,827,489	2,930
Number of radio talks broadcast or prepared for broadcasting	19,293	1,298	5,610	729	1,155	179	12,531	1,047
Number of events at which extension exhibits were shown	37,019	2,729	23,991	1,717	3,227	423	11,500	2,357
Method-demonstration meetings held	552,038	2,911	353,018	1,877	32,740	442	167,878	2,781
Attendance at such meetings	10,057,941	2,903	6,235,668	1,875	570,900	441	3,341,404	2,773
Result - demonstration meetings held	98,046	2,451	42,431	1,160	4,962	221	51,154	2,219
Attendance at such meetings	2,209,664	2,444	927,413	1,155	189,793	217	1,117,277	2,207
Adult tours conducted	9,685	2,261	3,220	945	96	38	6,564	2,014
Attendance at such tours	408,801	2,256	130,225	942	4,583	36	285,768	2,011
Achievement days held for adults	8,014	1,880	6,099	1,385	83	18	2,035	832
Attendance at such days	1,244,551	1,870	723,798	1,378	14,302	17	620,587	828

*This summary is indicative of agricultural extension's tremendous contact with rural America.

†Includes a small amount of work in counties without extension agents, reported by state club leaders.

1. *Growth in Personnel, 1914-1939.*—The maps dated 1914 and 1939 show the geographical expansions of extension influence during the last 25 years. Now the service is available to practically every farm family in the United States, Alaska, Hawaii, and Puerto Rico.

The counties shown in white on the maps

are without the service of extension agents. Many of these are in nonagricultural areas.

Under the provisions of the Smith-Lever Act, the Coöperative Extension Service was set up on July 1, 1914, with 1,613 workers. At the beginning of the current year, 1939, there were 8,680 extension workers.

Growth in Extension Personnel

1914-1939

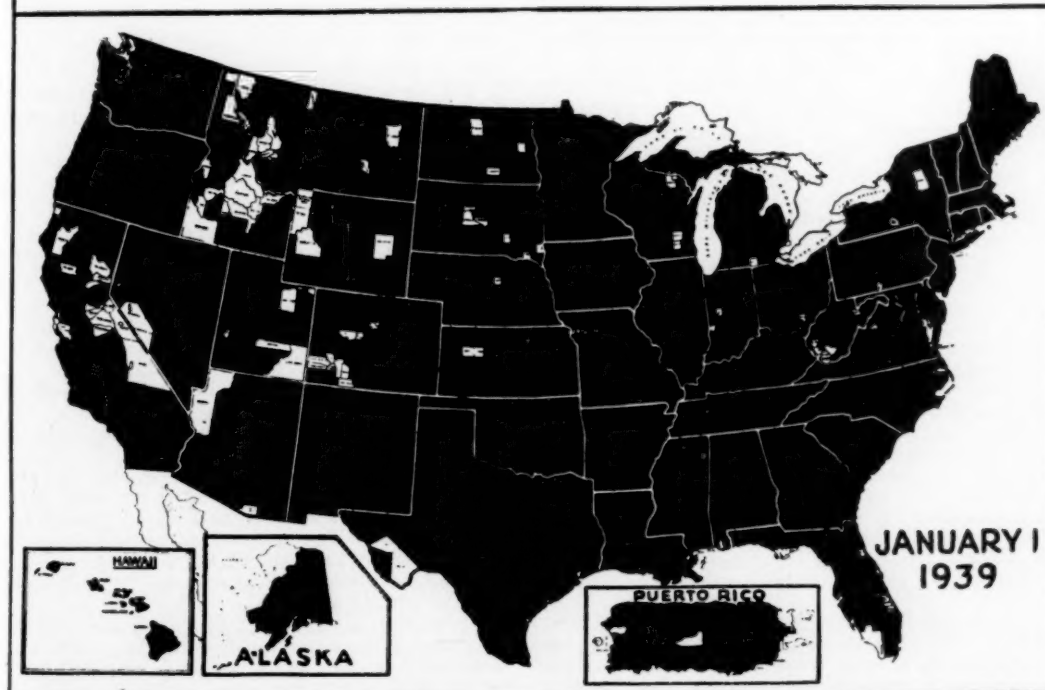
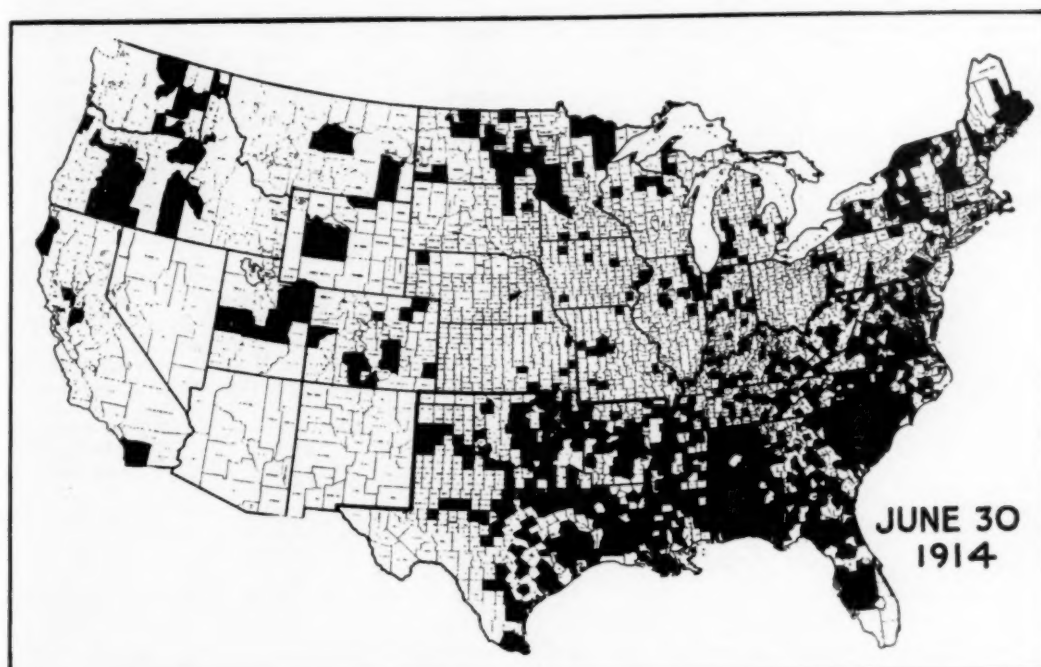


TABLE IV—Summary of activities by projects—1938.

PROJECT OR LINE OF WORK	COUNTIES REPORTING WORK	DAYS DEVOTED TO PROJECTS BY AGENTS AND SPECIALISTS	COMMUNITIES IN WHICH WORK WAS CONDUCTED	VOLUNTARY LOCAL LEADERS OR COMMITTEEMEN ASSISTING
Poultry	2,872	72,007	41,306	31,790
Bees	900	2,820	3,384	1,023
Dairy cattle	2,739	72,403	32,061	26,698
Beef cattle	2,533	46,614	23,504	15,103
Sheep	2,196	26,275	16,317	11,802
Swine	2,644	46,004	27,875	15,912
Horses and mules	2,020	13,147	15,741	10,729
Other live stock	576	2,692	2,109	754
Predatory animals	306	1,407	977	834

TABLE V—Summary of activities by projects—1938.

PROJECT OR LINE OF WORK	NEWS STORIES PUBLISHED	DIFFERENT CIRCULAR LETTERS ISSUED	FARM OR HOME VISITS MADE	OFFICE CALLS RECEIVED
Poultry	27,148	18,396	162,226	395,545
Bees	1,379	1,337	5,261	14,160
Dairy cattle	31,012	17,989	157,580	355,386
Beef cattle	16,248	8,889	112,306	275,371
Sheep	12,180	8,563	57,060	159,941
Swine	12,719	6,794	127,370	329,675
Horses and mules	7,145	3,578	38,931	111,221
Other live stock	754	393	5,613	20,884
Predatory animals	377	156	1,237	7,189

Serving the farmers in the 3,000 counties in the United States and including the agents in Alaska, Hawaii, and Puerto Rico there are 4,074 county agricultural agents and their assistants as compared to 881 in 1914.

Working with farm homemakers in these counties is a group of 2,136 home demonstration agents and their assistants, which has developed from the original group of 349 women on the rolls in 1914.

County 4-H club agents were not employed in 1914 but, now, 278 men and women are located in the counties to devote their entire time to the work of 4-H clubs.

From a nucleus of 50 negro extension agents working in the field on July 1, 1914, the number has grown to 504 extension agents devoting all their efforts to the benefit of the negro farm family of the South.

To support the work of the county extension agent and keep the machinery running smoothly, 622 administrators and supervisors are required in 1939, as compared to 162 in 1914. In addition, the services of 1,570 subject-matter specialists are now available, as compared to 221 in 1914.

Extension Activities in 1938.—The statistical information contained in the 1938 report is based on the annual reports submitted by 5,635 extension agents whose reports also include the work of assistant agents.

The distribution of agents' time and field time of specialists by projects is given in table I. For purpose of comparison, the corresponding percentages for 1937, 1936, 1935 and 1934 are also given.

With less than 16 per cent of the county agents' time spent in livestock work, an impressive showing is made (tables II-VI).

Result Demonstrations, 1938.—The total number of adult-result demonstrations conducted in 1938 was 767,714, as compared with 867,504 for 1937 and 881,208 for 1936. The number of projects completed by club members was 1,815,085, as compared with 1,593,329 in 1937 and 1,432,846 in 1936 (table VII).

4-H Club Work, 1938.—The upward trend in 4-H club enrollment, under way during the past several years, was further accelerated in 1938, when 93,644 more boys and girls participated in 4-H club activities than in the previous year. The number of boys and girls completing the work outlined was 97,120 larger than in 1937. The number of projects started was higher in 1938 by 212,661 and the number of projects completed higher by 221,756 than in 1937 (table VIII).

According to table IX, 67.13 per cent of the boys and girls were enrolled in club work two years and under, 15.67 per cent were enrolled three years, while the other 17.2 per cent have been in club work for a period of four years

or more. The average length of membership of 1938 club members was 2.26 years for boys and 2.24 years for girls, or 2.25 years for both boys and girls.

In table X, it will be noted that 41.26 per cent of the boys and girls in club work were 12 years old and under, 49.45 per cent were 13 to 15 years, inclusive, and the remainder, or 19.29 per cent, were 16 to 20 years of age and older.

Extension Work with Young Farmers and Farm Women.—In addition to the large increase in volume of 4-H club work during 1938, extension work with rural young people 16 to 25 years of age who were not in 4-H clubs increased materially also. The number of such organized groups decreased, however, from 2,065 in 1937 to 2,036 in 1938, but the membership in such special groups increased from

TABLE VI.—Summary of results—other agricultural projects—1938.

PROJECT OR LINE OF WORK	NUMBER OR VALUE	COUNTIES REPORTING
POULTRY		
Families following an organized improved breeding plan as recommended	85,129	1,739
Families following recommendations in purchasing baby chicks	252,607	2,265
Families following recommendations in chick rearing	310,570	2,448
Families following production-feeding recommendations	292,411	2,441
Families following sanitation recommendations in disease and parasite control	286,513	2,515
Families improving poultry-house equipment according to recommendations	92,118	2,377
Families following marketing recommendations	123,891	1,582
Families assisted in using timely economic information as a basis for readjusting enterprise	151,440	1,557
PREDATORY ANIMALS		
Farmers following recommendations	3,934	138
Total estimated saving due to control program	\$ 300,472	106
RODENTS		
Farmers following recommendations	160,132	798
Pounds of poison used	3,386,953	703
Total estimated saving due to control program	\$7,894,570	636
WILDLIFE		
4-H club members not in special project clubs who participated in wildlife-conservation activities	23,888	304
Farms on which specific improvements for wildlife have been made	23,390	573
4-H club members engaged in rabbit activity	1,368	167
Rabbits produced by 4-H club members	9,281	117
Adults engaged in rabbit activity	889	71
Rabbits produced by adults	6,044	40
4-H club members engaged in fox and other fur-animal activities	263	33
Animals produced by 4-H club members	1,191	20
Adults engaged in fox and other fur-animal activities	605	90
Animals produced by adults	10,479	50
4-H club members engaged in game-bird activity	9,727	453
Game birds produced by 4-H club members	50,240	267
Adults engaged in game-bird activities	17,012	422
Game birds produced by adults	912,055	253
4-H club members engaged in conservation-camp activity	2,481	414
Adults engaged in conservation-camp activity	940	139
AGRICULTURAL ENGINEERING		
Dairy buildings erected or remodeled	9,976	1,114
Regular silos erected	3,208	592
Trench or pit silos constructed	14,556	1,045
Hog houses erected or remodeled	15,757	1,147
Poultry houses erected or remodeled	32,858	1,874
Storage structures erected or remodeled	28,723	968
FARM MANAGEMENT		
Farmers making recommended changes in their businesses as a result of keeping accounts or survey records	44,519	1,228
Other farmers adopting cropping, live stock, or complete farming systems according to recommendations	301,454	1,490

TABLE IV—Summary of activities by projects—1938.

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Other farmers adopting cropping, live stock, or complete farming systems according to recommendations	301,454	1,490

TABLE VII—Summary of activities by projects—1938.

PROJECT OR LINE OF WORK	ADULT-RESULT DEMONSTRATIONS CONDUCTED	MEETINGS AT RESULT DEMONSTRATIONS	METHOD- DEMONSTRATION MEETINGS HELD	OTHER MEETINGS HELD
Poultry	28,056	7,109	27,165	17,561
Bees	860	121	624	805
Dairy cattle	11,533	2,119	12,155	19,737
Beef cattle	6,033	1,867	12,343	10,018
Sheep	3,313	700	6,890	7,029
Swine	12,139	3,053	18,035	9,369
Horses and mules	4,349	545	3,617	3,762
Other live stock	178	62	508	956
Predatory animals	170	18	152	189

TABLE VIII—4-H club enrollment.

	1935	1936	1937	1938
Junior clubs	60,720	68,341	70,306	74,594
Different boys enrolled	405,691	479,232	503,524	548,172
Different girls enrolled	592,053	666,276	688,861	737,857
Total enrollment	997,744	1,145,508	1,192,385	1,286,029
Different boys completing	279,228	324,763	361,171	407,329
Different girls completing	426,506	474,736	500,787	551,749
Total completing	705,734	799,499	861,958	959,078
Percentage of 4-H club members in school	93	94	94	94
Percentage of 4-H club members out of school	7	6	6	6
Projects started	1,869,366	2,159,326	2,336,721	2,549,382
Projects completed	1,242,323	1,432,846	1,593,329	1,815,085

TABLE IX—Membership in 4-H clubs according to length of time in club work—1938.

PERCENTAGE OF CLUB MEMBERS ENROLLED FOR						
	ONE YEAR	TWO YEARS	THREE YEARS	FOUR YEARS	FIVE YEARS	SIX YEARS AND OVER
Boys	42.33	24.72	15.49	8.35	4.53	4.58
Girls	42.39	24.81	15.81	8.41	4.46	4.12
Totals	42.36	24.77	15.67	8.39	4.50	4.31

59,637 in 1937 to 67,586 in 1938, indicating a tendency for the older youth groups to increase in size of membership.

Summary of Extension Influence.—The 1938 report summary indicates that on 3,733,584 farms changes in practices resulted from the agricultural extension program, while the home economics extension program influenced the adoption of improved practices in 1,332,950 farm homes and 571,311 other homes. The 1,286,029 4-H club members enrolled in 1938 came from 792,541 farm homes and 194,425 other homes.

A total of 5,525,371 rural families were definitely influenced by some phase of the 1938 extension program. Of this number, 4,634,774 were farm families and 890,597 were other families. The farm families influenced represent approximately 68 per cent of all the farm families in counties with extension agents.

This is, of course, difficult information for agents to obtain accurately. Hence, agents were instructed to make a conservative estimate based upon such records, surveys and other sources of information as were available.

A complete summary of all 4-H club livestock work for 1938 is given in table XI.

Cost of Agricultural Extension.—During the 25 years since the passage of the Smith-Lever Act, there has been expended in the United States from all sources—federal, state, county, and private—something less than one-half billion dollars. The federal government alone in one year expended more money for one phase of its agricultural program—the Agricultural Conservation and Domestic Allotment Act—than has been expended for extension work by all agencies in all time.

In writing of the first ten years of extension work under the Smith-Lever Act, W. A. Lloyd

correctly said that "Any attempt to measure the influence of county agricultural agent work is futile" and that "this is true of any form of educational effort." No one attempts to evaluate the public schools in terms of dollars and cents or to appraise the colleges in terms of currency. Nevertheless, it is possible by accurate compilation to place an estimate upon a few phases of extension work which have a measurable monetary value.

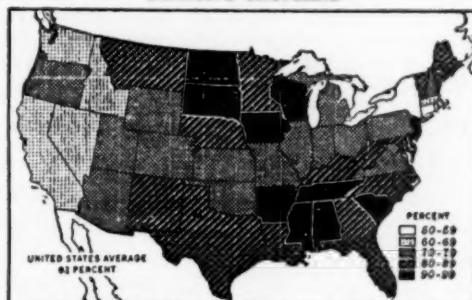
In California such a survey or estimate was made in 1931 by a staff of economists from one of the colleges. It was a laborious task, conscientiously done, which is not likely soon to be repeated. The survey showed an average annual gain from practices demonstrated entirely by the agricultural extension service and directly attributable to it of over \$28,000,000 in each of the years from 1925 to 1931, inclusive. This did not, of course, include values of such work as was essentially educational and upon which no dollar value could be placed. In those years there was expended from all sources in California for extension work sums varying from \$600,000 to \$800,000 per year. Those projects upon which a monetary return could be placed returned each year the cost of the enterprise 40 fold.

In contrast to these figures, Uncle Sam's present net outlay for PWA, AAA, etc., as reported by Ray Tucker in the *National Whirligig*, July 17, 1939, will soon reach a 1939 maximum of about \$300,000,000 per month.

It is reasonable to presume that the federal government expects the extension service to recover as much of these expenditures as possible by adoption of better farm practices;

otherwise much of this expenditure may prove to be in the nature of federal "credits" and "loans." Secretary Wallace's statement before

A. A. A. 1939 PROGRAM COVERS OVER 80 PERCENT OF NATION'S CROPLAND



The above chart shows the percentage of cropland under the A. A. A. program for 1939

the agricultural subcommittee of the Senate appropriations committee, April 13, 1939, was:

Reports indicate that approximately 22 per cent of the cotton farmers, 80 per cent of the commercial corn and wheat growers, between 70 and 80 per cent of the tobacco, rice, and potato growers, and 80 per cent of the commercial dairymen will participate in the 1939 program. It is expected that, in all, nearly 6,000,000 farm families will receive AAA payments in 1939. This number represents about 85 per cent of all the farm families in the United States.

Approximately 80 per cent of all of the farm land and approximately 70 per cent of all the

TABLE X—Membership in 4-H clubs distributed according to age—1938.

PERCENTAGE OF CLUB MEMBERS WHO WERE											
	10 AND UNDER	11	12	13	14	15	16	17	18	19	20 AND OVER
Boys	11.29	12.19	14.69	14.87	13.85	11.23	8.87	6.00	3.65	2.04	1.32
Girls	13.38	14.01	16.16	15.40	13.28	10.41	7.73	4.72	2.62	1.34	0.95
Totals	12.49	13.23	15.54	15.17	13.52	10.76	8.22	5.27	3.06	1.64	1.10

TABLE XI—Summary of results of boys' and girls' projects*—1938.

	NUMBER BOYS ENROLLED	NUMBER GIRLS ENROLLED	NUMBER BOYS COMPLETING	NUMBER GIRLS COMPLETING	NUMBER OF UNITS INVOLVED IN CLUB WORK
Agricultural engineering	13,429	1,368	9,576	987	78,809 units
Poultry	71,123	76,469	49,765	53,925	4,444,219 birds
Dairy cattle	49,221	8,352	37,278	6,460	54,707 animals
Beef cattle	36,349	3,717	28,603	3,096	43,894 animals
Sheep	21,388	3,410	16,644	2,788	73,948 animals
Swine	110,662	5,443	75,056	3,997	176,485 animals
Horses and Mules	7,591	494	5,812	396	7,162 animals
Other live stock	2,932	341	2,110	142	13,836 animals

*One club member may engage in two or more projects. The sum of the projects is therefore greater than the number of different clubs and club members involved.

privately owned range and pasture land in the United States will be included in the "triple A" program this year.

The accompanying map shows the AAA 1939 program covering the nation's crop land.

The extension service has a vast number of letters from persons engaged in every branch of agriculture and from those engaged in every sort of industry affiliated with agriculture, testifying in glowing terms to its helpfulness in their respective fields.

IMPORTANCE OF PERIODICAL PUBLICATIONS

The outstanding improvement in the official journal of the Association during the past six months will be a great aid in improving the public relations of the veterinary profession with the personnel of other sciences. With those in other sciences and professions, the literature of the veterinary profession represents its most frequent, most intimate and most influential contact. In a manner of speaking, our literature, particularly our periodical literature, is the show window through which the members of other professions and sciences view us. Official publications of our association are particularly potent in creating a good impression for our profession or otherwise; hence, this committee looks with unusual satisfaction upon the great improvement that has come about in the JOURNAL.

In this connection, the Committee expresses the hope that veterinary supply houses now publishing house organs will give consideration to the adoption of a more conventional system of capitalization, punctuation and hyphenation, and to diction in general. Of course, in a very real sense, the veterinary house organs are affairs exclusively of the houses that issue them. Nevertheless, they fall into many hands outside of the veterinary profession and in those hands carelessness or indifference in matters commonly given strict attention must have, at least in some degree, an undesirable influence.

INDIVIDUAL PUBLICITY FOR MEMBERS

There exists a desire on the part of many members of the Association for additional means of better acquainting the general public in their communities with the extent of veterinary service, its capabilities and the varied conditions under which it may

be profitable to the owners of live stock. This desire is, in part, due to their wish to see veterinary medicine serve the public interests to a greater extent. With a view to meeting this need, the Committee proposed the publication of a periodical magazine designed to enlighten the public on these matters and to distribute it by way of a list of names supplied by members of the Association. The following plan for such a publication was submitted to the Executive Board early in the summer and is receiving consideration.

Plan for a Popular Veterinary Magazine

A program of public relations is proposed, to be built around a self-supporting monthly magazine (16 pages or more) for general circulation, under the direction and sponsorship of the A.V.M.A., with the following objectives:

- 1) Educate the public to a better appreciation of the significance of veterinary medicine and of the veterinary profession and point out repeatedly the vital importance of the profession in our social and economic order;
- 2) heighten appreciation of the A.V.M.A. on the part of members, non-members and the nation's press;
- 3) cultivate and increase public interest in our domestic animals and animal wildlife;
- 4) educate and inform owners of animals as to the scope and need and value of skilled veterinary service, thus increasing the demand for services of A.V.M.A. members and developing new sources of income;
- 5) help members to combat the encroachments of incompetent intruders and other influences inimical to the veterinary profession and to the best interests of animal husbandry;
- 6) expand and extend the influence of organized veterinary medicine and increase the demand for it;
- 7) strengthen professional *esprit de corps* of the more than 5,000 members of the A.V.M.A. and make membership more attractive to the 6,000 other veterinarians eligible to fellowship in the Association;
- 8) enable each individual member of the Association or each local group of members to employ an educational public relations campaign, under their own names, at extremely low cost—a campaign of such proportions that they could not afford it as individuals or as local organizations; and
- 9) provide an authoritative source of interesting and accurate information in clear, understandable, nontechnical style for the use of the nation's newspapers, magazines and radio speakers.

Ethics.—The campaign outlined above would be built around a new monthly magazine, edited and supervised by representatives of the A.V.M.A. for distribution among their clientele, and would serve as a medium of publicity, education and public relations for the Associa-

tion and for each individual member who wishes to participate. The entire plan would be kept within the limits of rigid professional ethics at all times.

Appearance.—The magazine would contain 16 pages (or more), approximately $8\frac{1}{2}$ x 11 inches, in color, well illustrated, attractively designed, beautifully printed and ably edited.

Circulation.—Distribution would be limited to members of the Association, thus making membership more attractive. Each member would first be advised of the complete plan, and asked to indicate how many of his present and prospective clients he wishes to supply with the magazine each month. (Orders for less than 20 copies could not be accepted.) The magazines would be mailed out from Chicago to each of the addresses in an envelope carrying the name of the A.V.M.A. in a corner card. A small card would be clipped on the cover of the magazine, indicating that the Association sends the magazine with the compliments of the local veterinarian or local veterinary association.

Example.—Dr. X. of Kansas City has approximately 200 whom he regards as clients or prospective clients. Perhaps 100 of these are owners of horses or food-producing animals, the remainder being responsible for the care of pets. Dr. X. realizes that a well edited magazine circulated among these 200 each month in his name would build prestige for him and for his profession and create goodwill for him in his home community. Dr. X. decides that each of the 200 should be given a copy of the book each month, so he sends to A.V.M.A. headquarters a list of the names and addresses of his 200 together with a check for \$30, to cover the cost of producing and mailing the book. Should Dr. X. choose to contact only 100 of his list, the procedure would be the same but his check would be for only \$15. If he took but 20 copies, the cost, of course, would be only \$3 each month. Orders may be increased at any time; orders may be decreased (to not less than 20) or cancelled only upon a 60-day notice.

Duplication.—Should Dr. Y. of Kansas City also wish to participate in the campaign, his procedure would be identical with that of Dr. X. In cases where the names of prospective clients are duplicated and thus appear on the circulation lists of two or more members of the Association, the confidential clearing house in Chicago would cull out such duplications and return them to both doctors, advising them either to adjust the matter between themselves or, if no word were received from them, the identification card in each issue would include the names of both doctors.

Local Groups.—In cities and counties where local associations prefer to distribute the magazines as groups without identifying the individual veterinarians, the local secretary might act as a clearing house for the names of clients and submit the coordinated list to headquarters. The identification card in such cases would indicate that the magazine is sent out as part of an educational campaign of the local group.

Production.—McCormick and Henderson, Inc., Chicago, printers and publishers, would pro-

duce the magazine under the direction of the executive secretary or a duly appointed representative of the A.V.M.A. They would assist in gathering the material, prepare editorial matter, design the covers and inside pages, obtain illustrations and engravings, act as a confidential clearing house for the names of clients submitted by the members, print, publish, address and post each edition of the magazine after each step has been approved by the representative.

Advertising.—The sale of a few pages of advertising of a general nature in each issue is deemed advantageous for two reasons: To help defray the cost, thus reducing the subscription price to members, and to give it the flavor of a general-interest magazine rather than an elaborate folder to advertise the veterinary profession.

The back cover would be scaled to sell for \$500 per issue, the inside covers for \$400 each, and page 14 for \$300. (These prices are based on an expected circulation of 35,000 copies per month and are proportionate to prevailing advertising rates in similar publications.) McCormick and Henderson, Inc., would be of material assistance in the placing of this space under contract, but the Association would handle such sales direct with the buyer or his agency (perhaps through the same facilities and personnel now engaged in selling space in the JOURNAL). Thus, absolute control of the nature of the advertisements and responsibility for them would rest in the hands of the A.V.M.A.

Cost.—Based on an anticipated minimum circulation of 35,000 copies, the entire cost of gathering material, illustrations (both art and photographs), designing the pages, engravings (including color illustrations), editing, proof reading, paper stock, printing, composition, binding, inspecting, addressing, coordinating the mail lists, supplying printed envelopes and postage as outlined above would approximate \$6,300.

Income.—Revenue from advertising would be \$1,600 per month and 35,000 copies at 15 cents each would net \$5,250 each month. As planned above, this publication would equal in interest value and general appearance magazines now sold for 25 cents per copy or more.

Billing.—The A.V.M.A. would bill each member each month for the magazines to be issued the following month. All checks would come direct to Association headquarters, thus strengthening the direct relationship between headquarters and member veterinarians.

Promotion.—To acquaint the members with details of this public relations campaign, it would be necessary to print a folder explaining the whole plan and mail it to the membership with return cards to serve as subscription contracts. The return cards would determine the total of the first edition but it is reasonable to expect that, of the entire number of members, at least 1,750 would subscribe for the minimum number of 20 each. Experience with trade associations leads McCormick and Henderson, Inc., to believe that more than half of the membership would welcome such an opportunity for ethical practice-building public-

ity. Should the estimate of 1,750 be too low, additional orders would alter the cost favorably. Inasmuch as the magazine at all times would be the property of the A.V.M.A., any revenue in excess of the cost of production and distribution would be used either to lower the cost of the magazine per copy to the members or would accrue to the treasury of the Association.

McCormick and Henderson, Inc., believe it reasonable to expect that the average subscription would be in excess of 20 copies per month, basing this estimate on experiences with similar enterprises in other associations. In one group, an average of 64 copies has been maintained for three years, although the industry at first was hard hit by depression.

Financial Risk.—It is important to note that it is not necessary at this time for the officers and Executive Board to decide to spend any specified amount of money, not even the cost of preparing the introductory folder mentioned above, which McCormick and Henderson, Inc., will prepare and produce if the A.V.M.A. will address and mail it.

It is necessary now only to judge the general soundness of the plan; if it is approved, the introductory folder suggested above will be mailed to each member of the Association to determine just how many wish to take part in the plan and to what extent each is willing to support it.

On the basis of the members' voluntary support, the entire plan would be designed to be self-supporting. Should the response be insufficient, the A.V.M.A. has spent nothing but the addressing and postage on the introductory folder.

ASSOCIATION PUBLICITY

This committee has repeatedly stated in its reports that it does not consider what is usually included under the name publicity to be all or the most important part of its work. Unquestionably, however, it is the part in which the members are most interested and, with a view to putting this matter on a permanent basis and in professional hands, the Committee has submitted the following program to the Executive Board within recent weeks, asking that it be given consideration at this meeting:

PUBLICITY PROGRAM

Although the veterinary field is broad and fertile in public service, the public, as well as members of other professions, are scantily informed of the profession's true values and essential qualities. The need for general veterinary education in terms readily understandable to the public is apparent.

The essentials of news are clarity, importance and interest. Thus, a carefully prepared publicity program would bring to all public groups the message of the veterinarian in its most effective form of expression.

What the Association is doing becomes news, through the publicity program. This news when prepared requires national distribution and that requires the services of a highly trained and experienced organization.

The program for the Association would continuously and forcefully tell, in newspapers, farm and general magazines, industrial journals, newsreels and radio, the complete story of the veterinarian and veterinary medicine.

The program would carry to the ultimate of public understanding the entire range of public service, and the need for such service, offered by the profession.

The Association.—The program would devote considerable effort to the story of what the Association is and how it operates for the benefit of the profession and the public. Its aims and objectives must be kept before other professional groups as well if the work of the Association is to have the fullest expression.

Through stories to the daily newspapers, material made available to special newspaper departments and columnists, through magazine articles and pictures, through material furnished libraries and reference facilities of schools, the activities of the Association would be kept constantly in print.

Each issue of the Association's journal would be combed for stories of public interest or of interest to professional groups, and these articles would be carefully prepared with proper credit to the JOURNAL. The method would be to prepare the stories well in advance from proof sheets and distribute the articles prior to publication of the JOURNAL for simultaneous release on the publication date.

Speeches and statements of the officers would be made available in advance and stories featuring their news significance would be prepared and distributed. Careful coverage of this field would produce a large and important phase of the most valuable type of publicity.

Similarly, reports and statistics gathered by the Association would furnish an entirely separate publicity phase of large scope when carefully prepared and made available to the proper departments of newspapers and magazines.

Research sponsored by the Association affords another fertile field for publicity. Newspapers and magazines will use material of this kind when the human interest and public significance of the research results are stressed.

The many articles and pictures dealing with the various activities of the Association would naturally come to the attention of veterinarians who are not members of the Association. These releases would show them in a subtle manner the advantages of membership in the Association and would emphasize the necessity of their affiliating themselves. By constantly reporting activities sponsored by the Association, which are of benefit to members and to the profession as a whole, increased enrollment would be stimulated.

All in all, the purpose of the institutional publicity would be to show the many public service aspects of the Association and the veterinarians.

Annual Conventions.—Well in advance of the annual convention, newsworthy stories concerning plans for the sessions would be re-

leased to newspapers throughout the country. Sectional material, especially concerning the locality in which the convention is to be held, would be made available to all publications.

In addition, journals of the various component societies of the Association would receive special material on the convention, which would serve to attract a good attendance. Hometown papers of all members planning to attend the convention would be furnished with stories covering their participation.

At the time of the convention, all stories coming from the sessions would be covered and controlled by the publicity organization under the supervision of the Association. Correspondents would receive credentials from the Association and every proper method of cooperation with the press would be professionally afforded.

During the convention, in addition to assisting the newspaper men and photographers, daily releases would be prepared on all phases of the sessions. Abstracts of all speeches would be prepared well in advance of delivery and furnished to the press.

From the public point of view, an organization such as the American Veterinary Medical Association deliberately steps into the limelight at the time of its convention. The Association actually focuses attention on itself and it is here that the publicity force must be directed in the most careful way. It must fulfill the double purpose of obtaining favorable newspaper accounts and avoiding misunderstandings which, in some cases, have brought discredit upon national organizations.

Professional Relations.—Like every other profession, veterinary medicine is subject to discussion by persons and organizations engaged in other phases of health work. Similarly, others, for selfish reasons, might seek to foster public misconceptions regarding veterinary medicine.

It is part of the program to repel directly any such attacks on the veterinarians, as well as build bulwarks against them in the general work of spreading the truthful story of our work.

Most important is the publicity endeavor to strengthen relations with other professional groups through familiarizing these groups with a true and complete picture of veterinary practice.

This can be done in forceful manner by articles and pictures describing the high type of person who attends veterinary schools and the thorough training he receives. The work done in schools, already outlined, can be described for journals of other professions so that these groups can see evidence of the interest veterinarians display in research.

The important phase of professional relations must, of course, be kept strictly in line with the Association's policies at all times, and a publicity organization must always be guided accordingly.

Special Articles and Radio.—Articles signed by officers of the Association or officials of the component societies can be placed with national magazines, professional journals and newspaper feature syndicates if they are expertly prepared. Such work would be part of the pub-

licity program. Some of these articles would include statistical information on veterinary medicine and be in the nature of a discussion of the profession. They would have particular appeal to editors of college and high school publications and vocational journals. Others would discuss various aspects of animal care and be in the nature of "human interest" feature material, perhaps illustrated by drawings as well as photographs.

Radio provides an ever-growing outlet for the story of veterinarians. The publicity program would include preparation of special stories written for use of news broadcasters.

In addition, speeches and dramatized sketches suitable for radio stations would be prepared. When officials of the Association appear in various cities on speaking engagements and at the time of national and state conventions, radio time would be secured for material which would align with the occasions and, at the same time, tell again a veterinary story.

Legislative.—One of the first duties of any association is to educate lawmakers in the various states concerning the groups it represents. From time to time, selfish interests attempt to secure legislative advantages which might be harmful. If the relations of the Association with the legislators have been maintained on the best plane, it is comparatively easy to overcome such maneuvers.

The publicity program must include consistent contact with legislators so that the essential good relationship with the Association is always maintained.

In addition, when points of issue with antagonistic groups do arise, it is the function of the publicity agency to assist in combating any attacks on the Association.

Under this publicity program, legislators would be furnished with educational literature and, in addition, publications which they read would carry informative articles on veterinary medicine.

Personalities.—The leaders of the profession, officials of the Association, are the focal news personalities of the program. In their own communities and in the national press, these men would be given adequate publicity in the light of their importance to the public.

In addition, members of the Association who achieve special distinction would be publicized accordingly. Books they write, speeches they deliver and research in which they engage would be treated in press releases under the guidance of the Association.

It should be pointed out that in all publicizing of personalities, the Association would have complete control of the type of story—guarding against any hint of sensationalism. If this procedure is followed, editors would naturally come to consider the Association the sole source of authoritative stories concerning veterinary medicine.

Similarly, when news stories touching on any phases of veterinary medicine come up, editors would turn to the A.V.M.A. for confirmation of details and for expressed opinions of its officials. Thus, through its publicity program, the Association would become the single official spokesman for all veterinarians and for all phases of the profession's work.

Current Affairs.—In addition to the many functions of a planned nature, the "opportunistic" phase of publicity is important and its scope would be limited only by the extent of astuteness brought to bear by those handling the publicity.

By this we mean that the Association would take a leading part in the news of the day as such news affects its aims, ideals and activities.

For example, should a story "break" in the papers to the effect that all pets shall be barred from cities as insanitary or that dogs and children should not be raised in the same household, the Association would promptly issue a statement covering its own phase of the story.

Other stories would be released to the papers building up the veterinarian as the animal's best friend. The Association would offer seasonal advice to pet owners in other news releases on the subjects of worming, clipping and plucking, rabies, mange, fleas, etc. Seasonal advice to farmers would be sent out to rural papers, magazines and radio stations quoting the Association as the nation's foremost authority on animal-health problems.

The fact that the veterinarians were waging war on animal poisoners would be excellent news copy and would react favorably on the public.

An honor award for the man who contributes the most to animal or pet welfare, for example, would produce many good feature stories and pictures for the nation's press.

The research laboratories would be the source of a constant stream of good scientific stories that would present the A.V.M.A. as an aggressive, live organization.

Many other stories would be constantly turned up dealing with statistics on animals, prevalent diseases, etc.

Through publicity, therefore, the Association would become the sole source of information on all matters pertaining to animal health and its prestige would increase steadily with the public, the members and the non-members.

Youth.—In its effort to grow constantly into a larger organization with an ever higher type of member, the Association must endeavor to interest the higher caliber high school students into taking up veterinary medicine as their life work.

By means of the right type of publicity, this field can be painted as a new frontier—a field that offers untold opportunities to America's youth, which is shut out of industry and the other professions by overcrowding.

A twofold program should be directed at the nation's youth. First, they should be sold on the opportunities that await them in the profession and, second, they should become thoroughly familiar with the work of the veterinarian. The youth of today can be educated to the more frequent use of the veterinarian for their own pets. This, in turn, would make the position of the veterinarian stronger when today's youth comes of age.

Strategic News Center.—Chicago occupies a unique position from the standpoint of publicity in that the press associations and picture syndicates all clear through Chicago.

For example, the press associations (Associated Press, United Press, International News

Service and the Tribune Press Service) all divide the country into sections, called legs. These legs are designated by sectional names, such as the eastern leg, northwest leg, southwest leg, etc. All legs have their terminal in Chicago. A story which is placed on the wires in New York is sent to Chicago, where it is relayed to other sections of the country, if it is considered a national story. A story of national interest filed in any part of the country other than Chicago must pass through an editor's hands in the Chicago office before it can go out over the other sectional wires. This greatly decreases its chances of national coverage. However, when a story is filed in Chicago, it is immediately sent to every section of the country without passing through additional hands. It is fortunate, therefore, that the executive offices of the Association are located in Chicago.

It is vital that no national publicity be released without the knowledge and approval of the A.V.M.A. officials. No material must ever be released from the publicity organization without our approval. Therefore, the proximity of the A.V.M.A. headquarters to the national center for the distribution of news makes for greater speed and efficiency if the publicity organization, too, is located at that center. For these and other reasons, the Committee recommends that if a definite program of year-round publicity be undertaken, Theodore R. Sills & Company of Chicago be considered for the work.

STATE VETERINARY MEDICINE

In previous reports we have stressed the importance of a close alliance between our private and public veterinary service. As previously stated, there has been a trend in recent years toward state veterinary medicine, and we have urged that the relationship of private practitioners with those now engaged in state veterinary medicine be placed upon the most mutually beneficial basis, not only for the immediate improvement of both services, but that in the event state veterinary medicine should be largely extended, it will not find the profession unprepared for its new obligations, nor those less qualified in a position to usurp functions that should be lodged in professional hands.

We have a large proportion of state veterinary medicine at the present time. It includes our army veterinary service, federal meat inspection and other routine work of the Bureau of Animal Industry of the U. S. Department of Agriculture, the veterinary section of our experiment stations, federal and state, federal and state veteri-

nary laboratories, the state veterinary extension service, the state livestock sanitary services and veterinary functions exercised by city and state boards of health and other municipal authorities as a part of our regular official governmental system. In addition, we have the federal-state cooperative animal disease-control projects for tick-fever eradication, bovine and avian tuberculosis and John's disease eradication, hog-cholera control and Bang's disease control and eradication. Altogether, these services constitute a vast network of state veterinary medicine. An extension of meat inspection to the majority or all of the states, extension of veterinary service to the Rural Resettlement Administration, extension in milk inspection and the inclusion of veterinary service in the county health services now being organized by the U. S. Public Health Service might conceivably, within a brief period, place the major part of our veterinary service within state veterinary medicine.

A program for the organization of a state livestock disease-control service was suggested in our report a year ago. Since that time all state veterinarians, or other heads of the state animal disease regulatory services, have been invited to discuss the plan, and most of them have responded. Except for one part, the plan is approved by the majority. Except for a single dissension, our recommendation that the office of state veterinarian be a civil service position was emphatically endorsed by those having the greatest experience and responsibility in this line of work. Several of the state veterinarians have said that if such a general plan were endorsed by this association and the United States Live Stock Sanitary Association, it would be materially helpful in bringing about an improvement of their own services.

In view of these statements from those most interested, we recommend the appointment of a committee by this association to meet with a similar committee of the United States Live Stock Sanitary Association to draft such a plan for the endorsement of both associations, in order that those interested in improvement of

measures for the control of livestock disease in any state may have this authoritative backing and support for their efforts.

VETERINARY PRACTICE LAWS

Even the most casual investigation reveals that most practitioners are not satisfied with the veterinary laws under which they operate. Most of our veterinary practice laws were enacted by the various states in the period 1895-1910. Few of them have been materially improved by amendments since that time. Therefore, it is not surprising that each biennium when the state legislatures meet, veterinary practice acts come up for discussion in a number of them. During the past winter, six legislatures had under consideration the enactment of new veterinary practice laws. Without intending it as a criticism either of veterinarians interested in such laws or the state legislatures, the Committee is forced to say that, in most instances, the matter was poorly handled and the results were unsatisfactory.

Because of this showing in state legislatures, the Committee undertook a study of veterinary practice acts, since they officially govern the relations of the practitioners with the public. Each state veterinary examining board was asked to supply the Committee a copy of the veterinary practice act of its state, and judicial and other official interpretations of those acts, accompanied by information as to how well the act is enforced and how satisfactorily.

The primary, one may say the sole purpose of a veterinary practice act is to protect the livestock industry of the state. Its aim is to keep the livestock owners from being imposed upon and suffering loss from the ministrations of persons incompetent to handle livestock disease. Naturally, such laws will usually work to the advantage of competent veterinarians in that if enforced, they will relieve such practitioners of the competition of the incompetent, a competition that is prone to be unscrupulous and destructive. Veterinarians seeking legislation should never lose sight of the fact that this latter effect is purely incidental and not an objective of practice laws. Some have viewed veterinary legislation as an at-

tempt to protect or favor qualified veterinarians, and their experience with legislators has not been happy.

Since copies of some of the state veterinary practice acts were received only a few weeks ago, this committee has not had time to make a detailed study of them. Perhaps it is not its function to do so. However, from a cursory examination of the information collected, it is obvious that in a large majority of cases, these laws do not fit present conditions.

At the time most of these laws were enacted, equine practice constituted the great bulk of veterinary service. Practice with food-producing animals constituted but a minor part of veterinary work, and poultry and small animal practice was quite unimportant. Except for sanitation, practically all of the preventive medicine that now constitutes so large a part of veterinary service was then unpracticed and unknown. Anti-hog-cholera serum had not been developed, bacterins were unknown, antigens were not used, allergic and agglutination tests for the diagnosis of disease were mainly in the future. The veterinary practice acts reflected those conditions accurately. In few, if any, states is it illegal under the veterinary practice acts for a person not a licensed veterinarian to use anti-hog-cholera serum and virus, tetanus antitoxin, equine encephalomyelitis vaccine, fowl-pox vaccine or in any manner to treat a healthy animal for the prevention of disease. In other words, most veterinary practice acts, by direct statement (*e.g.*, in Illinois) or implication (by mentioning certain services and omitting others), regulate only the treatment of sick or injured animals or surgical operations for relief of deformity, and in most, if not all, of them, all veterinary service for other than farm animals is excluded from their provisions. The treatment of poultry, and dogs and cats, which has become so important in recent years, is legally just not veterinary practice. In a number of states (*e.g.*, Alabama) the law contains no definition of what constitutes veterinary practice. In such cases the courts would undoubtedly attempt to establish what was generally

regarded as veterinary practice at the time the law was enacted and interpret that as the intent of the legislature. The laws are lame in that they do not cover the public health functions of veterinary service, such as meat inspection, milk inspection and autopsies made for the purpose of diagnosis.

From this cursory examination of the subject, this committee believes that a veterinary practice act should embody, at a minimum, the following provisions:

1) That the purpose of the act is to protect the livestock industry and the general public;

2) that there will be included under veterinary practice: a) All measures for the prevention of disease in animals, b) the diagnosis of animal diseases, c) all treatment of the diseases of animals, and d) all surgical operations upon animals;

3) that exemptions from the provisions of the veterinary practice act apply to: a) Owners who diagnose disease in or treat their own animals, provided that in their treatment they make no use of agents capable of causing disease in animals, b) treatment of animals as a neighborly act, for which no compensation of any kind is requested, expected or received, c) minor surgical operations performed by the owners of animals and to castration and dehorning performed by the owner on animals less than 6 months of age;

4) that there will be included under veterinary practice such part of meat inspection as depends upon the recognition of disease or disease process in animals or in the carcasses of animals;

5) that there will be included such part of milk inspection as depends upon the recognition of disease in the cow supplying the milk or in the herd of which it is a part;

6) that all official reports of autopsies on animals or laboratory findings will be limited to the report of those findings, leaving to the veterinarian who has seen the case the interpretation of the laboratory findings or diagnosis, if any;

7) that there will be provision for a small annual registration fee of licentiates,

the proceeds of which will be available to the veterinary examining board for enforcement of the act;

8) that all provisions of the act apply equally to state, county and municipal employés, as to others;

9) that there will be included anti-cruelty to animals measures embodying the present concept of the humane treatment of animals and prohibiting unskilled and unnecessary treatment; and

10) that there will be included appropriate penalties for violation of the act.

Incidental to this investigation of veterinary practice acts, it was developed that this association concerns itself but little with the portals of entrance into the veterinary profession, and that some members of veterinary examining boards resent this indifference. The American Medical Association gives much attention to the work of state licensing boards and attaches great importance to their activities. Since it is the licensing boards that say who may or may not enter the veterinary profession, their function is an extremely important one to this Association and we recommend:

1) That a section of veterinary licensure be established in our organization and that it be given the support necessary to make it function;

2) that the Committee on Legislation or a special committee appointed by the Association for the purpose set about immediately to prepare a model veterinary practice act for the guidance of members in whose states veterinary legislation may be under consideration; and

3) that when such a model veterinary practice act has been formulated and approved by this association, it should, upon request, aid and support committees of affiliated state associations in their efforts to secure the enactment of veterinary practice acts in the various states, incorporating such parts of the model veterinary practice law as, in the opinion of the said state committees, may be desirable and advisable.

We shall, of course, turn over to the Committee on Legislation or the special committee appointed for this purpose the

veterinary practice acts, opinions, judicial interpretations and other information in our possession.

MILK INSPECTION

During the year this committee has received requests from members of the Association for information as to desirable provisions of milk-inspection ordinances for small communities. These requests came from members who are more or less familiar with the model milk-inspection ordinance adopted by the U. S. Public Health Service but who feel that it is not entirely suited to their communities.

The Committee feels that if veterinary practice acts embodying the provisions outlined in the foregoing were in effect in various states, the Public Health Service model milk-inspection ordinance would be satisfactory, since it would place strictly veterinary work in veterinary hands and permit local authorities to decide whether other parts of their milk inspection should be carried out by veterinarians, laymen or members of other professions. However, since no state now has a wholly satisfactory veterinary practice act and, doubtless, it will be many years before all states have such laws, if they ever have them, it seems advisable that the Committee on Food Hygiene prepare a model milk-inspection ordinance based upon the U. S. Public Health Service's model milk-inspection ordinance and containing only such modifications as, in their opinion, are necessary so that our members promoting public health projects in their communities may have this authoritative guide upon which to act.

MEAT INSPECTION

Since the interest of our members in meat inspection is equally as great as in milk inspection, we recommend that the Committee on Food Hygiene prepare also a model meat-inspection ordinance suitable for rural, county or small city meat inspection for the guidance of those who may be interested in procuring this type of service for their communities. There is a definite demand from our membership for

such information from an authoritative source.

GRADUATE VETERINARY EDUCATION

The present public health project of the U. S. Public Health Service includes a considerable amount of graduate instruction. Highly trained specialists, as obstetricians or pediatricists, are provided to lecture to small groups of physicians, such as those of a rural county. The lectures are given two hours a day, for a period of five days. The physicians are thus enabled to attend them without neglecting their practices. The American Medical Association promotes this educational program among its members.

It is recommended that our committee on education explore the field to ascertain if funds may be made available for this instruction of veterinarians in meat inspection, milk inspection and the control of diseases of animals, such as rabies and others communicable to man. If a project of this character be undertaken, we urge that the Association do everything possible to popularize it among veterinarians.

ETHICS

The public estimate of our profession is affected to a degree by the conduct of individual members. The question of ethics is a live one among us at the present time and it is recommended that the Association take official cognizance of it. We believe that we can not longer afford to ignore this matter.

THE USE OF COMMITTEES

The public relations of the A.V.M.A. are under a handicap because of the lack of a comprehensive, permanent policy governing all its actions. The Association is large and has good prospects of becoming much larger. It has already reached the point where it should function chiefly through its whole-time employes, its officials and committees active throughout the year. At the present time it makes inadequate use of its committees and derives little benefit from them. They are heard but once a year and, even then, their recommendations are not

commonly acted upon either favorably or adversely. The central office, the Executive Board and other officials act upon matters falling distinctly within the provinces of various committees without a thought of referring them to those committees for their counsel. Also, one committee sometimes acts upon a matter that distinctly belongs to another committee.

This is not the way that large, successful organizations, industrial, trade or professional, function. Our committees supposedly are formed of men who are experts in their particular lines. They should be consulted when matters are acted upon that fall within their respective provinces. Only in this manner will a definite policy be followed and only in this way can the Association profit from the best information available among its membership.

BETTER INFORMATION FOR MEMBERS

The work of this committee would be facilitated if the A.V.M.A. represented a more homogeneous group. Too many of our members are not sufficiently interested in the profession as a whole or informed as to its problems. We think the reason for this lies chiefly in the failure of our official journal, in the past, to inform the membership of the workings of our organization, and to discuss its problems and the problems of the profession. For many years the working of the organization was shrouded in darkness as far as the rank and file of the membership was concerned. There is small wonder that they were not interested.

We appreciate that, in recent months, the JOURNAL has been improved in this respect as in others, but we think that more is required—that meetings of our Executive Board and the House of Representatives should be reported after the fashion that meetings of the Council of the Royal College of Veterinary Surgeons are reported in *The Veterinary Record*, and that intermeeting activities of our various standing and special committees should be discussed during the year.

We think that every issue of the JOURNAL should discuss problems the Association is

facing and what is being done to solve them, to the end that our whole membership may be fully informed as to such matters and have a better appreciation of what the organization is doing for them and for the veterinary profession. The American Medical Association and the *Journal of the A. M. A.* are examples of the welding of a far-flung organization of diverse interests into a compact unit and the methods by which this can be achieved. Even in its present improved form, in our opinion, our official organ stresses veterinary science too much at the expense of the veterinary profession and veterinarians. Veterinary medicine includes all three, and it is to the profession of veterinary medicine that we belong.

(Signed) D. M. CAMPBELL, *Chairman.*
K. G. MCKAY,
JOHN D. RAY,
C. F. SCHLOTTHAUER,
E. C. W. SCHUBEL.

Report of the Representative to the American Association for the Advancement of Science

WARD GILTNER

THE 103RD meeting of the American Association for the Advancement of Science, the first in Richmond, Va., was held December 27-31, 1938. Walter Bradford Cannon, George Higginson professor of physiology at Harvard University, was elected president. He is the first physiologist and the sixth representative of the medico-biological sciences to fill this position. His predecessors were Minot, Welch, Flexner, McMurrich and Abel. The Association prize of \$1,000 was awarded to Norman R. F. Maier, assistant professor of psychology at the University of Michigan for his work on "Experimentally Produced Neurotic Behavior in the Rat." His results with the lower animals may become significant in the field of neurotic behavior in man. The feature of the meetings of the Section on Medical Sciences was a symposium on mental health, the most comprehensive ever

held. There were no contributions of special interest to veterinarians.

For the second time in its history the A.A.A.S. held a meeting in Wisconsin. The summer meeting was held in Milwaukee, June 19-24, 1939. Under the direction of Section N, Medical Sciences, symposia were held on "Sulfanilamide and Related Compounds" and "Vitamins with Particular Reference to Their Standardization."

Your representative has taken care of the routine correspondence with the officials of the A.A.A.S.

Respectfully submitted,

(Signed) WARD GILTNER.

Policy

B. T. SIMMS, *Chairman*

A COMMITTEE of the Executive Board made up in part of the same personnel as the Committee on Policy has been studying the whole organization and program of the Association for the past two years. The report of this committee, together with the president's address, will carry recommendations for future development and policy. It would be a repetition for the Committee on Policy to give these same recommendations.

This report, therefore, is simply an endorsement of the recommendations as expressed in the president's address and in the report of the special committee of the Executive Board.

(Signed) B. T. SIMMS, *Chairman.*

H. D. BERGMAN,
M. JACOB,
H. W. JAKEMAN,
L. A. MERILLAT.

The new constitution and administrative by-laws provides for a complete rearrangement of the work on policy, public relations and publicity. All of the work of a general nature concerning the Association's relations to outside groups or functionaries will be coordinated at the central office by making the executive secretary an ex-officio member of the new committee to which these promotional projects will henceforth be delegated.

Food Hygiene

J. G. HARDENBERGH, Chairman

FOR THE PAST two years the reports of the special Committee on Food Hygiene have dealt with various phases of milk hygiene, particularly the veterinary aspects of this field of public health. (See the JOURNAL, vol. xci, n.s. 44, No. 4, October, 1937, pp. 451-458, and vol. xciv, n.s. 47, No. 4, part 1, April, 1939, pp. 313-322.)

The first report reviewed the need for milk inspection, the official agencies responsible for its administration, the professional training of milk-inspection personnel and the participation of veterinary agencies as an essential part of any well rounded milk-inspection program. The second report embraced a study of the courses in milk hygiene offered in schools of veterinary medicine and stressed the need for additional post-graduate study if veterinarians are to specialize in milk control and other phases of food hygiene and render the best possible service in these fields.

TRAINING OF MILK-INSPECTION PERSONNEL

Recognizing the responsibilities involved in our own professional participation in public health work, especially milk hygiene, the facts concerning the qualifications of milk-inspection personnel should be kept in mind. A recent bulletin (Public Health Bulletin No. 245, December, 1938, "Milk Supplies and Their Control in American Urban Communities of Over 1,000 Population in 1936," by A. W. Fuchs and L. C. Frank, U. S. Public Health Service) shows that 60.9 per cent of the urban communities of 1,000 population and over in the United States had available in 1936 the full-time or part-time services of at least one milk inspector with professional training. By professional training is meant a degree in medicine, veterinary medicine, public health or sanitary engineering, agriculture or some other technical branch of learning.

Although nearly two-thirds of the communities reported upon had milk-inspection

personnel with professional training, only 44.9 per cent of the inspectors possessed a degree of any kind. As reported by Fuchs and Frank, professional training existed in the ranks of local milk inspectors to the extent shown below:

Degree in	Per Cent
Medicine	8.4
Veterinary Medicine	18.8
Engineering	1.9
Other degrees	15.8
No degrees	55.1
	100.0

The authors point out:

Contrary to expectation, the percentage of inspectors with a degree varied inversely with size of city, ranging from 55.6 per cent of those serving the smallest municipalities to 21.6 per cent of those in the largest. This is largely due to the fact that physicians and veterinarians were more frequently engaged in milk control in the small municipalities than in the large ones. The physicians were almost entirely city or county health officers who personally assumed milk inspection duties, a practice most frequent in the smaller communities. Most of the veterinarians who did local milk-control work were also engaged in private practice, and this, too was more common among the smaller municipalities. Geographically, the percentage of inspectors having a professional degree was highest in the Mountain States.

The most frequent professional degree was that of veterinary medicine, which was held by 18.8 per cent of the inspectors devoting either all or part time to local milk control. Medicine was second, held by 8.4 per cent of such inspectors (health officers); only 1.9 per cent had an engineering degree; and 15.8 per cent had some other degree. As the proper testing of pasteurization equipment and processes can best be done by engineers, the scarcity of plant inspectors with engineering degrees, especially in the bigger cities having large pasteurization plants, is food for thought. Not a single engineer was employed on local milk control for any of the reporting municipalities in the Mountain and Pacific divisions, and only one in New England. The Mountain States had the largest percentage of veterinarians.

The professional training of state inspectors employed either full or part time on milk is also of interest. Over half of these inspectors also had no degree, the percentage being almost exactly the same as that for local inspectors. As tabulated by Fuchs and Frank, the professional training of 282 state inspectors was as follows:

Degree in	Per Cent
Medicine	0.4
Sanitary Engineering	2.5
Veterinary Medicine	13.2
Agriculture	5.3
Other degrees	23.0
No degree	55.6
	100.0

QUALIFICATIONS OF MILK-INSPECTION PERSONNEL

The foregoing data are cited to emphasize the necessity for setting up proper qualifications for the workers engaged in milk hygiene and related fields of public health service. Some states have undertaken to bring about a better status in this respect. For example, New York State adopted regulations in 1937 defining the qualifications for three grades of milk inspectors, these grades being determined by the population group served as follows:

Grade I.—Those in charge of the milk-inspection service of any county or county health district, or of any city having a population of 50,000 or more, according to the last federal census, shall have the qualifications prescribed for grade I. The qualifications for inspectors in grade I shall be practical experience and special training and education in milk sanitation, consisting of:

a) Graduation from a university or school of recognized standing with a degree in public health or sanitary engineering, veterinary medicine or agriculture, provided that graduates shall have completed acceptable courses in milk sanitation; and shall have had not less than one year of satisfactory full-time experience in milk sanitation; or,

b) completion of a course of instruction in milk sanitation approved by the public health council as qualifying for this grade,

provided that such persons shall have had not less than three years of satisfactory full-time experience in milk sanitation; or,

c) any combination of education, training and experience which in the opinion of the public health council is the equivalent of either of the above qualifications.

Grade II.—Those in charge of the milk-inspection service of a city, town, village, or consolidated health district having a population of more than 10,000 and less than 50,000, according to the last federal census, and inspectors acting under general supervision of milk inspectors in municipalities or districts in which milk sanitation is required to be under the charge of grade I inspectors, shall have the qualifications prescribed for grade II. The qualifications for milk inspectors in grade II shall be practical experience and special training and education in milk sanitation, consisting of:

a) Graduation from a high school and completion of a course of instruction in milk sanitation approved by the public health council as qualifying for this grade, provided that such persons shall have had not less than one year of satisfactory full-time experience in milk sanitation; or,

b) completion of a course of instruction in milk sanitation approved by the public health council as qualifying for this grade, provided that such persons shall have had not less than three years of satisfactory full-time experience in milk sanitation; or,

c) any combination of education, training and experience which in the opinion of the public health council is the equivalent of any of the above qualifications.

Grade III.—Milk inspectors of any city, town, village, or consolidated health district having a population of less than 10,000, according to the last federal census, and inspectors acting under general supervision of milk inspectors in municipalities or districts in which milk sanitation is required to be under the charge of grade II inspectors, shall have the qualifications prescribed for grade III.

Nothing herein shall be construed to prevent the employment or appointment of a milk inspector in a grade lower than that for which he is qualified. The qualifications

for inspectors in grade III shall be practical experience and/or special training and education in milk sanitation, consisting of:

a) Not less than one year of satisfactory experience in milk sanitation; or,

b) completion of a course of instruction in milk sanitation approved by the public health council as qualifying for this grade, provided that such persons shall have had not less than three months of satisfactory experience in milk sanitation; or,

c) any combination of education, training, and experience which in the opinion of the public health council is the equivalent of either of the above qualifications.

The adoption of such grades or ratings and qualifications should have a marked beneficial effect upon the personnel involved which should be reflected in the calibre of work done. However, as pointed out by one member of the Committee, the c) qualification under each of the foregoing grades has a possible element of weakness in that it places the applicant's qualifications directly under the control of the public health council; in spite of the "equivalent" restriction on the applicant's education, training and experience, if the council should happen to be subject to political domination (it is not in this instance), this qualification could be used to defeat the purpose of the regulations.

FACILITIES FOR ADDED TRAINING IN PUBLIC HEALTH WORK

The desirability and necessity for providing an even better trained body of public health workers is evident. To meet this need, a variety of facilities are available. At a number of established educational institutions regular courses in public health and hygiene are offered, leading to the degree of D.P.H. or similar certifications. In addition, less formal courses are frequently offered by educational institutions and other agencies. In the May 1939 *American Journal of Public Health* (pp. 570-575) are listed summer-school courses in public health given at some 30 institutions throughout the country. These summer courses in many instances offer

excellent opportunities for veterinarians who are interested in additional training.

For example, Rutgers University in New Jersey has offered for the past 13 years summer courses in public health administration. These courses are designed to meet the needs of three groups of people: First, employes of health departments who wish to increase their knowledge or review subjects studied some years ago; second, persons hoping to secure employment as sanitary inspectors who often need to study and obtain practical information under the guidance of experienced public health workers in order to pass an examination for the required license; and, third, board of health members, nurses, teachers and other persons who want a well rounded short course in public health administration to broaden their horizon in this field.

The subjects taught are applied bacteriology for health workers (including milk and water analysis), principles of public health administration and community sanitation and hygiene, principles of milk handling (including production, pasteurization, farm and milk-plant inspection, laws relating to milk and its products, and laboratory work), and principles of communicable disease control. The foregoing subjects are included in the first term of six weeks. The entire schedule or course covers two summers. During the second term, the following subjects are taught: bacteriology, public health education, administration, law and vital statistics, sanitary engineering, mosquito- and fly-control measures, food and drug control, communicable disease control (including epidemiology and immunity, and special public health programs, such as tuberculosis, child hygiene and social hygiene).

That the courses fill a real need in a satisfactory way is evidenced by well filled classes year after year and by requests from graduates for extension courses of the same type.

Another example of advanced training methods is furnished by the State of Texas, which conducts schools for milk-inspection personnel, water- and sewage-control personnel and other public health activities.

New York State also provides, every year, regional schools of two-week duration in two or three cities of the state wherein are conducted advanced courses for milk and dairy inspectors. In these schools, the faculty is drawn from the state department of health, from the colleges of agriculture and engineering and from other qualified sources. The schedule provides a comprehensive course in milk sanitation all the way from cow to bottle, including composition and secretion of milk, cattle diseases and their control, production, handling, pasteurization, construction, and operation of milk-plant equipment, sterilization, laboratory control measures, legal aspects of milk control, etc. Such courses, conducted by a faculty of men who know not only the academic and technical aspects of milk production and control but also the everyday practical aspects, contribute much to improve milk sanitation.

These training facilities have been dealt with at some length in order to indicate the facilities available in some states, perhaps in many, to veterinarians who are either now engaged in, or are interested in becoming associated with, milk-control work and related activities and who desire to qualify themselves as well as possible. There are probably very few states where suitable faculty personnel and facilities for special training along these lines do not already exist. In many instances, all that is necessary to their development is the recognition of the need for better training of our public health workers. Emphasis on added training is also indicated because the progress of the veterinary profession, as well as other professions, in public health work depends upon the demonstrated fitness of the personnel to carry on the necessary work and to keep pace with new developments in hygiene and disease control.

OTHER PHASES OF FOOD HYGIENE

Although the past two reports of this committee, and the present one also, have been confined principally to milk control, there are a number of other food-hygiene problems which deserve equal attention.

Members of the Committee have suggested a number of important problems which deserve thorough study but which can not be considered here because they would render the report unduly long or because of our lack of time to investigate them. As a matter of record, they are listed herewith.

1) A campaign to bring about greater attention to the production of milk and cream on the farm. Too many states and municipalities concentrate their attention on the processing of milk to render it safe (a desirable public health measure) but neglect the source of production. "Most good or bad milk starts on the farm and that is where milk hygiene should start."

Also, since the smaller municipalities and rural areas most often suffer the penalties of inadequate or inefficient milk inspection, much good might be accomplished in many areas by organizing such work on a county or other geographical basis; each such area should have the services of a well schooled, well qualified, full-time dairy inspector who would actually pay attention to the production of milk for local consumption and be responsible to a state agency. Such work might be carried on in coöperation with other county agencies, such as county agricultural, bureau of animal industry and health agencies.

2) A program to stimulate the construction of approved slaughter houses, so placed on a geographical basis that adequate abattoir facilities are available to all towns. The uninspected 30 per cent of our annual slaughter of food animals in this country should be brought under official veterinary inspection.

3) A study of, and a policy to be formulated for, adequate official veterinary inspection of poultry and rabbit slaughter. Such committee work under 2) and 3) should be correlated with similar committee activities of the United States Live Stock Sanitary Association.

4) Accumulation of information on broader aspects of food hygiene pertaining to foods of animal origin as affecting public health; for example, trichinosis and amebic and balantidial dysentery.

5) Ascertain the activities of veterinarians, veterinary associations and veterinary schools in food hygiene in foreign countries. This information might be very useful in guiding our own policies.

SUMMARY

This report presents information concerning 1) the training of milk-inspection personnel, 2) the setting up of qualifications for milk-inspection personnel, 3) facilities for added training in public health work, and 4) other phases of food hygiene that merit study and the formulation of policies by this association.

It is recommended that the special Committee on Food Hygiene be continued.

Respectfully submitted,

(Signed) J. G. HARDENBERGH, *Chairman*.
B. B. COALE,
MILTON R. FISHER,
WARD GILTNER,
A. R. MENARY,
VINCENT C. MOYER.

Nomenclature of Diseases and Vital Statistics of Domestic Animals

H. C. H. KERNKAMP, *Chairman*

THE SPECIAL Committee on Nomenclature of Diseases and Vital Statistics of Domestic Animals met in Chicago on November 30, 1938, to deliberate and discuss matters pertinent to its activity.

It was the consensus that a necessity exists for the collection, classification, and codification of the names and terms used to designate the diseases and causes of death of animals and that work toward these ends should be undertaken. It was a further consensus that at some future time a central bureau or agency should be created, whose duty it would be to collect and compile vital statistics on the diseases and causes of death of animals.

The Committee recognizes that the matter of nomenclature and that of vital statistics are separate and distinct entities but are complementary. It was agreed that the phase of our work dealing with nomenclature

should precede the compilation of vital statistics. A more complete and, therefore, more valuable statistic will result if the undertaking follows this course.

We are appreciative of the vast amount of work that will be required to collect, assemble, classify and codify the names and terms used to designate the diseases and causes of death of animals. The interest and cooperation of the persons engaged in the various more or less specialized branches of veterinary medicine must be obtained before a wholly acceptable job can be accomplished. The advisability of this was demonstrated when the medical group undertook the important task of compiling and printing the *Standard Classified Nomenclature of Disease*, now in its second edition. Representatives from the many branches of medicine helped to make the compilation as complete as it was then apparently possible. The book is gradually being adopted by the medical profession at large and is being installed in the record rooms of hospitals and clinics in various parts of the United States and Canada.

The Committee is mindful of work already done in this and other countries toward compiling and listing the names and terms applied to many of the pathological conditions affecting animals. Many of these appear as reports of the diseases encountered in the in- and out-patient clinics of veterinary colleges, departments of pathology, and diagnosis laboratories of colleges, experiment stations, livestock health departments, and meat inspection services of federal, state, municipal, dominion, and provincial veterinary organizations, as well as some privately operated veterinary clinics and hospitals.

The most recent and most complete list of the diseases of animals is one compiled by the veterinary staff of the Veterinary Research Institute at Onderstepoort, Pretoria, South Africa. It is published as a draft of an international list of animal diseases and was distributed at the Thirteenth International Veterinary Congress in Switzerland (1938). The group of South African veterinarians responsible for this work are to be commended for their excel-

lent contribution, which aims toward an international standardization of the names and terms used to designate the diseases of animals.

This and the lists referred to above will be of inestimable value to the Committee. The *Standard Classified Nomenclature of Disease* should also serve as an invaluable aid and guide to the undertaking.

This account is submitted as a report of progress. It is believed inadvisable to attempt a detailed report before a better opportunity is afforded to consider the problem as a whole and before specific and basic factors more to the intent of the assignment have been analyzed.

Respectfully submitted,

(Signed) H. C. H. KERNKAMP, *Chairman.*

GEORGE H. HART,

I. A. MERCHANT,

H. W. SCHOENING,

E. A. WATSON.

Representative to the Horse and Mule Association of America

T. A. SIGLER

AS YOU KNOW, the Horse and Mule Association of America is a national organization, educational in character. Its purpose is to advertise and promote the horse and mule industry. The Association has been a leader in the horse and mule business and has helped to promote interest in all branches of this great enterprise.

Despite the fact that motive power has made great inroads on horse power, the horse still continues to be the most valuable animal on American farms, and there is more money tied up in this breed of live stock than in all other breeds of farm animals combined.

The Association has helped to create interest on the part of the general public and to keep it horse-minded. It also has been instrumental in keeping down harmful propaganda. Vast damage was being done to the horse and mule industry and to farmers by misleading statements regarding encephalomyelitis that were disseminated by tractor interests. The Association ex-

plained to the press and radio executives the serious damage being done and enlisted their aid in publicizing to farmers the fact that the disease is not as serious as it has been reported to be. Further, they assured them that many animals would escape if nothing were done, and many would recover if properly handled by able veterinarians.

Instead of farmers' losing 30 to 40 per cent of their animals, which this propaganda was claiming, they would not lose more than 2½ or 3 per cent in any event, they pointed out. They received magnificent coöperation from the press association and radio stations. The Association sent out about 28,772 letters within three months to farmers and breeders all over the country, and this information was made available to thousands more. In these letters they urged the farmer to have his veterinarian vaccinate the horses and mules. The result: There have been no losses where vaccination was employed. This, of course, provided a great deal of work for the veterinarian.

On April 10 of this year, the newspapers carried an appeal to farmers from the American Foundation for Animal Health, asking them to call a dentist for their horses so that the animals could maintain their strength during the heavy work period in the spring.

In Indiana, we have been staging spring stallion shows in different parts of the state for the past few years. These give the farmer a chance to see the sires offered for service. These shows are usually given early in March. From March 14-18 of this year, it was estimated that over 300 horses were sent on parade in five district shows. Each year the events attract a greater number of interested out-of-state stallion owners and other persons interested in Indiana's Percheron and Belgian horses.

A little later in March, an outstanding sale was held in Indiana, the second annual Percheron sale held in that particular locale. The sale was attended by 1,500 buyers from many states and 32 head of horses were sold. The mares brought an average price of \$325. The highest priced individual animal was a mare, which brought \$600. A

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California buyer paid \$1,000 for a team of 5-year-old black mares. Stock was sold to buyers from the states of Indiana, California, Iowa, Wisconsin, Pennsylvania, Ohio, Illinois, Kentucky and Nebraska.

Right here in Memphis, you have one of the largest mule markets in the world. Columbia, Tenn., long claimed to be the mule capitol of the world, was the scene of a gala event recently. About 50,000 persons were on hand for this affair. Mules were shown and traded and were the chief topic of conversation. One thousand of these handsome hybrids were paraded. This event was started about 100 years ago, when breeders met to show their stallions, jacks, jennets, and brood mares. First known as Breeders Day, it is now known as Mule Day. No motors were in the line of march that day. Directly back of the mules was a division of the famous Tennessee walking horses, then jacks, jennets, draft horses and ponies. At the height of the ball on the same evening, the grand march was led by a mule.

Already, various states are beginning to be known and characterized by a certain breed of Equidae of outstanding importance in that locality. Tennessee is known for her mules and walking horses. Kentucky is famous for her breeding of racing and saddle horses. Missouri mules still bring fame to that state, as well as her saddle horses. Indiana, Ohio, Illinois, and Iowa are known for their Percheron and Belgian horses, and these states, as well as many eastern and western states, maintain fine studs of different breeds.

The work of the Horse and Mule Association of America is carried on, as it has been in the past, to aid and encourage the breeding and raising of horses and mules on the farm, and to increase the use of pleasure horses. The use and production of pleasure horses have increased by leaps and bounds. Many riding clubs have been opened all over the country and many small town horse shows were given during the past summer. No celebration seems to be complete without a horse show. It is the spirited saddle horse which seems to take

the eye of everyone. So interesting are these shows that your reporter recently witnessed two large open shows during which the crowd stood in a downpour of rain until the events were finished.

The pulling contests continue to be popular in the farming sections. In some places, the pulling contests alone were staged—not in connection with a horse show. Horse owners display greater enthusiasm over the pulling power of their teams each year and, like the owner of a good fox hound who will bet "she will run a half mile ahead of her bark," are willing to wager their all on a good pulling team.

The national horse association has done much to bring about added interest, through the leaflets and booklets which are sent out from time to time. A great many to whom these have been mailed have requested additional copies. One book, called "Horse and Mule Power in American Agriculture," a 72-page publication dealing with feeding, care and management of horses, proper methods of hitching, and the judging of horses and mules, is literally a textbook in thousands of schools in the country. The demand still continues, and a new edition will soon be issued.

On the mailing lists are thousands of breeders, dealers, vocational teachers and county agents. They have sought every avenue to pass the information along to those interested in horses. At weekly intervals this information is forwarded by the press association to about 300 papers that receive their releases regularly. Last December and January the Association carried out a program to increase membership. Many men and women have enrolled and are receiving valuable information.

The Horse and Mule Association of America appreciates the coöperation and financial support given by the A.V.M.A. and earnestly solicits our aid in the future.

Respectfully submitted,

(Signed) T. A. SIGLER.

The percentage of veterinarians who use microscopes in their offices is said to be higher than that of physicians.

Report of the Representative to the National Research Council

H. E. BIESTER

THE NATIONAL Research Council is composed of eight major divisions, among which is included the division of medical sciences. The representative of the A.V.M.A. serves as a member of that division. Within its administrative set-up is an interdivisional committee that is now designated "the committee on medical problems common to animals and man." At the present time the personnel of the committee is as follows:

H. E. Biester, *Chairman*

R. E. Coker (chairman of the division of biology and agriculture)

W. W. Cort, School of Hygiene, Johns Hopkins University, Baltimore, Md.

Henry B. Ward, University of Illinois, Urbana, Ill.

Prior to my appointment to the Council, E. R. Long, then chairman of the division of medical sciences, also served as chairman of the committee on medical problems common to animals and man. My predecessor, the late M. C. Hall, had a number of conferences with Dr. Long on the trichinosis problem, which constituted the work of the committee. Through the efforts of Dr. Long material from human autopsies was obtained from the majority of states. These specimens formed the basis for studies on the incidence of trichinosis in man. Other phases of this problem were also considered by them. Much credit is due our late, lamented colleague, Dr. Hall, for placing the A.V.M.A. representation to the Council on a participating basis.

The committee on medical problems common to animals and man met on April 21, 1939, the day preceding the meeting of the division of medical sciences. All members of the committee were present. The following items were considered:

Trichinosis.—The status of the problem was discussed and the need for certain additional information on the incidence in swine obtained under controlled conditions was brought out. The chairman was authorized to seek resources and facilities for

carrying out these plans. W. H. Wright of the U. S. Public Health Service attended the meeting by invitation.

Rabies.—No definite action was taken on this item pending the report of the A.V.M.A. special Committee on Rabies. After other medical groups have considered the problem in a similar manner, it is hoped that the various conclusions can be evaluated and stated in a manner that will permit their adoption as the national policy on rabies. This might form the basis for the inauguration of carefully considered research projects which may furnish information and guidance in situations where an agreement can not be reached. Through the influence of the National Research Council grants have been obtained for the inauguration of needed investigations in other fields. It was suggested that a symposium on rabies be sponsored which may lead to the formation of a committee empowered to seek aid for the support of that type of program. The Association can be very helpful in fostering plans in this connection. The results of such cooperative efforts would be more effective than independent action.

Listerellosis.—The committee also discussed the need of support for certain studies on this infection with special reference to its human aspect.

The report of the committee on medical problems common to animals and man dealing with these three items was presented at the meeting of the division of medical sciences of the Council on April 22, 1939.

The above constitutes merely a progress report and it is hoped that in the future the Association's representation on the Council will lead to constructive achievements.

In conclusion, I wish to express my gratitude to the members of the special Committee on Rabies for furnishing information which aided in presenting the problem to the Council in a preliminary manner. I am also indebted to E. R. Long, past chairman of the division, and to the members

Bang's Disease

C. R. DONHAM, Chairman

DURING the past year Bang's disease-control activities have passed a noticeable degree through some healthy, evolutionary types of changes. Your committee desires to direct attention to these changes, along with a consideration of current situations and trends of thought relating to the Bang's disease problem.

We are in a period when recommendations to individual herd owners, originating from different sectors of the veterinary profession, lack desired uniformity. This is in a measure due to the fact that a procedure that may be to the best financial interests of one herd owner may be ruinous to another. Often, this is attributable to economic considerations entirely apart from any technical phases of this disease. When this situation is projected to a group or community, we find that the financial interests of a given individual may be in open conflict with the interests of an overwhelming majority of the herd owners in that area. For example, if out of ten herds in an area, nine are free from Bang's disease and one is not, it is obvious that the owners of the clean herds have a right to expect the government to compel, if necessary, the owner of the diseased herd to eliminate that reservoir of infection. This action may not only be detrimental to the immediate financial interests of the individual diseased herd owner but may actually be the instrument which hastens an impending financial crisis. The argument can be advanced that the owner of this diseased herd is headed for financial ruin anyway, and this is certainly true in most, but not all, instances.

We are, therefore, rapidly advancing into a period in many communities where the

common good requires the government to institute procedures which may sacrifice the immediate financial interests of a small minority. This must be done in order to serve the best interests of the majority and to provide maximum public health protection. We have passed through similar periods with regard to other communicable diseases and have triumphed. But these evolutions have not been without sacrifices, bitter controversies and many heartaches. We may expect history to repeat itself with respect to Bang's disease.

One of the most important trends that has become markedly apparent is the increased amount of work that is being done on the area plan of control. The area plan of control is obviously the answer to the problem presented by disappointing results obtained in some herds under the individual herd plan, especially in communities where the incidence of Bang's disease in cattle is high. It should be pointed out, however, that while the area plan of control is desirable, it is not always essential to successful eradication of the disease from individual herds. There are thousands of herds in which the disease has been eradicated and the herds maintained free from Bang's disease year after year even in grossly infected areas. Latest reports supplied to this committee through the courtesy of the United States bureau of animal industry indicate that area work has been taken up in about 430 counties in 22 states. In 349 of these counties the initial test of all cattle has been completed and, out of 3,768,403 cattle tested, 3.2 per cent, or 124,183, were found to be reactors. In 58 counties retests of all the herds, containing approximately 462,000 cattle, have been made, showing a reduction to 0.7 per cent infection.

The federal law requiring that the federal payment for Bang's diseased cattle shall not exceed the amount paid by the cooperating state, territory, county or municipality became effective on May 1, 1939.

(Continued from preceding page)

of the committee on medical problems common to animals and man.

Respectfully submitted,
H. E. BIESTER.

Directly resulting from this act of Congress, 36 states have made appropriations or other provisions for paying indemnity. The total of state funds available for one year is approximately \$3,500,000. No provisions for indemnity payments in the Bang's disease work were made in the remaining twelve states, namely California, Colorado, Indiana, Kentucky, Massachusetts, Mississippi, Nevada, New Jersey, Oklahoma, South Carolina, South Dakota and Texas.

The following data, supplied through the courtesy of the United States bureau of animal industry, indicate the results of activities in the Bang's disease work the past year:

Approximate number of agglutination blood tests applied per month. 650,000

Approximate percentage of reactors during recent months (this figure includes retests and does not represent the incidence of Bang's disease) 3

BREEDING CATTLE OVER 6 MONTHS OF AGE UNDER SUPERVISION

In United States.....about 21%
In 7 states.....more than 50%
In 13 states.....25% to 50%
In 15 states.....10% to 25%
In 13 states.....less than 10%

Until July 1, 1939, efforts to control Bang's disease were handicapped somewhat by the lack of uniformity in antigens. Your committee is pleased to report that difficulties from this source should be reduced to a minimum in the future since the supplying of uniform antigen for all official testing, both by the test tube and plate methods, has been assumed by the federal bureau of animal industry. The following statement pertaining to this new activity of the bureau was kindly prepared by Chief John R. Mohler and supplied to the Committee for inclusion in this report.

Special facilities have been provided at the Animal Disease Station, Beltsville, Md., for the production and testing of both the tube and plate antigens to be issued to the various laboratories engaged in this work. In planning for this production, space and apparatus have been provided to meet not only the approximate present demand for the antigen but also consideration was given for the normal increase which un-

questionably will develop in the course of extending the eradication program.

It has been determined from the reports and estimates that the total amount of tube antigen required at the present time is 40,000 cc. of the concentrated material per month, which, when diluted 99:1, totals 4,000,000 cc. The total amount of plate antigen is approximately 18,500 cc. per month.

It is evident that in preparing these antigens every precaution will be taken to provide uniform production with regard to sensitivity and density. Furthermore, before distribution each batch will be subjected to the regular sterility test to insure its freedom from any contamination. It is hoped that through the centralization of the production of the antigen more uniform results will be obtained in the application of the agglutination test, thereby eliminating discrepancies which have unquestionably resulted from the use of antigens prepared in different laboratories.

In previous years your committee has offered the following recommendation: "We should work toward the ultimate objective of placing the responsibility of diagnosis with the field veterinarian." The arguments favoring such a policy were covered in considerable detail and it does not seem appropriate to repeat them at this time. It should be pointed out that this recommendation has nothing to do with how or where the agglutination blood tests are carried out. It applies only to the interpretation of those tests. Full responsibility in this regard has not been officially placed in the hands of the field veterinarian but it is encouraging to note that there has been a very definite trend toward this objective in actual practice and that modifications in regulations are being contemplated which will, if put into operation, go part of the way toward this objective. Those responsible for this trend are to be commended for their action. A survey of opinion on this matter and for suggestions for this report, solicited from a rather large group of especially qualified veterinarians, indicates that an overwhelming majority emphatically agree with this recommendation. Your committee desires to renew this recommendation.

The Committee wishes to emphasize strongly the importance of the proper use

of Brucella vaccines in order that the members of the profession will at least know how they should be used or, perhaps it is better to say, how they should not be used. The improper use of Brucella vaccine is very detrimental to the progress of the Bang's disease work, especially on the area plan of control. In discussing the use of Brucella vaccines, it is essential to consider mature cattle and calves entirely apart, one from the other.

VACCINATION OF MATURE CATTLE

Scientific evidence, legal considerations and the majority opinion of informed persons regarding vaccination of mature cattle all unite to give a definite and clear-cut judgment of the merits of this procedure. The following developments are cited:

- 1) Several years ago the United States bureau of animal industry discontinued issuing permits to manufacturers for the production and distribution of virulent live-culture Brucella vaccines for the prevention and control of Bang's disease in cattle.

- 2) Since July 1, 1938, the licensed manufacturers of Brucella vaccines using strain 19 of low virulence have been prohibited from recommending the use of such vaccines in mature cattle.

- 3) Effective July 1, 1938, the agreement between the cattle owner and the federal secretary of agriculture made no provision for testing herds in which any mature cattle have been vaccinated for Bang's disease. Thus, in effect, the entire herd in which mature animals are vaccinated becomes permanently ineligible for federal indemnity payments.

- 4) Consistent with these provisions, some states have promulgated laws and regulations which deny future state indemnity funds for animals in herds in which mature cattle are vaccinated.

These legal considerations certainly indicate that the vaccination of mature cattle is considered inadvisable. In spite of all this, the facts are that many mature cattle are being vaccinated improperly with Brucella organisms. Let us analyze the reasons for this situation and the advantages and disadvantages of vaccination of mature cattle. In order to do this, it is necessary

to divide mature cattle into several categories, as follows:

A. NONINFECTED HERDS

Because of the limited experience in the control of Bang's disease through vaccination under both experimental and field conditions, it is considered inadvisable at the present time to use Brucella vaccine in herds that are free from Bang's disease. There have been instances where clean herds, eligible for accreditation, have been vaccinated by practicing veterinarians without the owners' even being informed that such vaccination would produce positive reactions to the agglutination blood test and thereby render the herds ineligible both for accreditation and for indemnity payments if the disease should appear in the herd subsequently. Such practice is the cause for righteous indignation on the part of cattle owners toward our profession.

B. INFECTED HERDS

Infected Animals, Pregnant or Nonpregnant.—The use of vaccines in infected mature cattle does not do any particular harm or good. Such vaccines are for prevention only and have no apparent virtue as curative agents. Infected animals already have living Brucella organisms in their tissues and specific agglutinins in their blood. The addition of a few more living bacteria through a hypodermic syringe does not cause any appreciable change in the status of infected animals.

Noninfected Pregnant Animals.—The vaccine should not be given to pregnant cattle, since it may cause them to abort and, thus, spread infection. It also may cause them to spread infection in the case of a seemingly normal birth. The vaccination of such mature cattle has the further disadvantage of usually causing them to become positive reactors to the agglutination blood test, and such reactions can not be distinguished from those of naturally infected animals.

Noninfected, Nonpregnant Animals.—“The vaccination of mature cattle, even though nonpregnant, is considered inadvisable,” is a quotation from a widely cir-

culated press release of March 4, 1937, by John R. Mohler, chief of the bureau of animal industry. *Brucella* vaccines do have some value in this narrow, restricted group of cattle, namely, noninfected, nonpregnant mature cattle, in that vaccination of such animals frequently results in a reduction in the rate of abortions as compared to what usually happens when this type of animal becomes infected naturally. Such practice, however, usually has the disadvantage of causing them to become positive reactors to the agglutination blood tests, which interferes with the correct interpretation of agglutination titres in the event that the test-and-slaughter method of control is used subsequently. Such positive reactions also commonly interfere with the farmer's market for surplus cattle and, especially, if the most profitable market is in another state. These reactions also bar animals from most cattle shows in our country. These are important factors in the profitable operation of the majority of herds.

Thus, we find that the vaccination of mature cattle is ill-advised. Why, then, do some thoroughly sincere veterinarians and cattle owners disagree with this judgment of the merits of vaccination of mature cattle? The answer is apparently simple. These people obviously are overlooking an important part of the natural course of this disease. Diseased cattle commonly abort once or twice and, thereafter, usually carry their calves full time whether or not they have been vaccinated. Therefore, the decline in abortion rates frequently is incorrectly attributed to the use of vaccines and, especially, if the vaccines are used soon after a storm of abortions, which is frequently the case.

CALFHOOD VACCINATION

Calfhood vaccination for Bang's disease is still in the experimental stage and, therefore, should not be recommended for general use. Additional controlled experiments have been conducted during the past year and there also has been considerable activity in the gigantic uncontrolled field experiment inaugurated by the federal bureau of animal industry in January, 1936,

and tentatively planned to cover a period of five years. For good reasons, the results of this field trial with calfhood vaccination have not been released. This study is reported to be progressing very satisfactorily. The owners of approximately 260 herds of cattle in 24 states are coöperating. More than 11,000 heifer calves between the ages of 5 and 7 months have been vaccinated to date. About 15 per cent of these have completed the first gestation period and some of them the second period. All of the vaccine used in this study is produced in the laboratories of the federal bureau of animal industry. Calfhood vaccination is also being used by private practitioners of veterinary medicine and others.

The vaccine is prepared by biological concerns under federal permit and is tested from time to time at the Animal Disease Station at Beltsville, Md. This action is considered to be very important. It should be pointed out that the *Brucella* vaccines being used for calfhood vaccination are supposed to be suspensions of living *Brucella* organisms of low virulence, not avirulent. Further, we have no definite knowledge yet to assure us that this status of low virulence will remain unaltered under all of the changes of environment to which these organisms are subjected when grown in different laboratories and injected into living bovine tissues. Until sufficient accurate information is available to give us this assurance regarding the safety of the procedure as well as information indicating its true merits, widespread use of the method should be discouraged.

Because the vaccine, as now prepared, contains living *Brucella* organisms, although of low virulence, it should be administered under official authorization by veterinarians who are familiar with the precautions to be observed in the use of living vaccines and who are qualified to judge when and where the use of the vaccine is indicated. Unlike vaccination of mature cattle, vaccination of calves between the ages of 4 and 8 months does not disqualify animals and herds from eligibility for federal and state indemnity payments. Some vaccinated calves develop positive re-

actions to the agglutination test which persist indefinitely. The federal government will test vaccinated calves after 18 months have elapsed following vaccination, and any reactors found are eligible for indemnity payments under the test-and-slaughter plan of control.

It is the belief of your committee that calfhooed vaccination, if used for Bang's disease control, should be restricted to badly infected herds and should not, at this time, be used as a preventive measure in noninfected herds. As a matter of policy, your committee wishes to point out that *Brucella* vaccination, at the present, can at best play only a limited rôle in the scheme of control of the disease in this country. The vast amount of work already done establishes the fact that a large percentage of herds can be freed from this disease and maintained free through our giving reasonable care to agglutination testing, segregation, and disposal of reactors. The objective of the Bang's disease-control program should always be to eradicate the infection. If vaccination establishes its merit, it would appear that it can be used only as an aid to eradication of the disease. Its use, from the present knowledge and viewpoint, can be applied only to the so-called problem-herd group.

There can be no doubt that the use of living vaccines, even for calfhooed vaccination, is antagonistic to the area plan of control. In the final analysis, each state or community that is contemplating the area plan of control must recognize that if owners are permitted to maintain infected herds in the area and vaccinate their calves, then there is no area plan of control in that instance. In other words, it is not the calfhooed vaccination itself which is apt to cause trouble but, rather, the diseased cattle that have been left in these herds in the area. The area plan of control is obviously very closely allied with any discussion of the public health phases of this disease.

UNDULANT FEVER

The question of the attitude of the veterinary profession toward the problem of

undulant fever in man is one which is constantly before us. Your committee desires to go on record in this regard with the following statements:

1) There can no longer be any reasonable doubt as to the existence of a disease of man, commonly known as undulant fever or brucellosis, which is caused by *Brucella* organisms of animal origin.

2) At this time there does not appear to be any scientific evidence to show that one human ever acquires brucellosis from another human.

3) Therefore, it appears, in the light of present knowledge, that the prevention and control of brucellosis in man is directly dependent upon its control and eradication in the animal kingdom.

The matter of lack of uniformity in state regulations pertaining to interstate movements of cattle affected with Bang's disease has been the cause of much confusion and righteous dissatisfaction on the part of cattle owners. In fact, some of the laws and regulations in different states have not been revised for many years and are therefore antiquated. It is urged that states give attention to the revision of livestock sanitary regulations to meet the livestock owners' present needs.

NEED FOR RESEARCH STILL PARAMOUNT IN BANG'S DISEASE CONTROL

As a result of the rapid progress that has been made in Bang's disease control, a number of new problems have presented themselves during the few years that this program has been in effect. These new problems along with those that were recognized at the time the program was started present a situation where forceful emphasis is needed on research. There is apt to be a feeling in some quarters that since Bang's disease control is well on its way, the need for research is on a diminishing basis. Your committee desires to point out that exactly the opposite is true. It should be kept in mind that vast sums of money are being expended for the control and eradication of this disease. No opportunity should be lost to study the many unsolved problems pertaining to it.

The amount required for more emphasis on research would be small compared to the vast sums now required to control the disease. Relatively small sums of money spent in research might easily save large sums in control activities and in values of the cattle industry by developing new methods. A discussion of unsolved problems pertaining to this disease and the researches needed to find the answers should be interesting to all, but this does not seem to be the appropriate place for such a discussion. In this regard, the report of this committee last year pointed to the desirability of further research on *Brucella* infections in farm animals other than cattle. Such researches have been continued during the year, but more are needed.

SHEEP MAY BE IMPORTANT RESERVOIR OF BANG'S INFECTION

Bang's disease is being legally defined as a disease of cattle. It is entirely possible that this definition will need to be expanded to include some other farm animals. That is, we may find it necessary to consider reservoirs of infection in the other farm animals before attaining complete success in eradication of the disease in cattle. During the year there have been reports from various parts of the world, particularly Russia and some other countries of Europe, of the extensive occurrence of brucellosis in sheep. Heretofore, we have not considered the ewe as an important reservoir of Bang's disease infection. A survey of the incidence of the disease in ewes in the United States, as indicated by agglutination blood tests, is being conducted on an extensive scale by the federal bureau of animal industry.

(Signed) C. R. DONHAM, *Chairman.*

C. H. CASE,
A. EICHHORN,
C. P. FITCH,
W. WISNICKY.

Calfhood vaccination (for Bang's disease) developed by Cotton and his associates requires cultures of low virulence and that they be given at an early age.—*Hardenbergh.*

Tuberculosis

A. E. WIGHT, *Chairman*

THE CONTROL and eradication of bovine tuberculosis in this country have progressed satisfactorily during the past twelve months. We are pleased to report that all counties in all of the states except California are in the modified accredited area, and have been since July 1, 1938. All of the municipalities in Puerto Rico are in that status, and this also applies to the Virgin Islands. In California only eight counties remain in the nonmodified area, and in spite of the fact that there has been much organized opposition in some of them, there will be additional counties modified within the next year, although it may not be possible to complete the work in two or three of them.

Information received from the Bureau of Animal Industry, United States Department of Agriculture, indicates that tuberculin tests were applied by veterinarians engaged in this work to approximately 11,100,000 cattle; the number of reactors was about 60,000. The average extent of infection for the entire country, outside of California, was only 0.34 per cent. It continues to be necessary to conduct the retesting of herds of cattle in the tuberculosis eradication work, especially in the sections where there was a considerable amount of infection in the beginning of the project. Your committee wishes to call attention to the importance of this retesting, and in many instances it should consist of an annual test of herds where there is liable to be remaining infection somewhere on the premises.

PERSONAL CONTACT WITH OWNERS AIDS CONTROL AND ERADICATION

The location of centers of infection of tuberculosis many times is made possible through the reports received from the packing houses where cattle are slaughtered under state or federal supervision. Veterinarians call upon the owners of such herds, if it is possible to locate them, and make retests of the remaining cattle on the premises and, in some instances, apply the tu-

berculin test to hogs and poultry. This gives an opportunity for the veterinarian to have a conference with the owner in regard to the future handling of the herd as far as tuberculosis is concerned, and experience has proved that some valuable work in the control and eradication of the disease can be done in this way.

MORE "NO VISIBLE LESION" CASES BEING REPORTED

In the report of this committee last year, mention was made of the fact that a higher percentage of so-called "no visible lesion" cases were being reported. This is true and is a matter that is receiving careful study under competent research directors. The problem is also being given attention by the veterinarians engaged in the work in the field, and your committee recommends that these two features be enlarged upon, if possible. The forming of a committee of perhaps three members to prepare a critical analysis of the problem and formulate a research program that could be followed by those who would be in position to participate in investigations of this nature might be desirable.

AVIAN TUBERCULOSIS STILL A PROBLEM

As indicated in previous reports of this committee, the problem of avian tuberculosis continues to be an important one in several states of the middle and north central sections of the country. Efforts have been made to control and eradicate this type of tuberculosis, which not only affects poultry, causing serious losses to that industry, but which is readily transmitted to swine, causing additional losses in connection with that industry because parts and carcasses are condemned as unfit for food purposes on account of the presence of the disease. Many veterinarians have devoted considerable time to this problem and several in the employ of the federal government and states are devoting all of their time to it.

The results of this work in some localities have been very satisfactory but, in others, the opposite condition has prevailed. Many times it is difficult to induce the

owners of flocks of poultry on the average farm to give any attention to the necessity of following methods of handling the poultry that will make it possible to reduce the extent of tuberculosis and, eventually, eradicate it from the premises. The disposition of the hens after the first laying period continues to be one of the most important features of the eradication program.

Reports have been received from packing centers where swine were shown to have tuberculosis, and veterinarians have been assigned to the duty of investigating the cause of the disease and attempting to eradicate it. This has proved to be a very satisfactory method of interesting the farmers who are in the infected area and who are having difficulty in keeping their poultry and swine free from the disease. Your committee believes that this work should be continued and enlarged upon to the fullest possible extent. It is observed that the proportion of drawn poultry being shipped to marketing points is increasing. This is encouraging, for it will be helpful to the tuberculosis-eradication program to have more poultry dressed under the veterinary supervision of the states or the federal government.

It would seem that some system could be developed whereby it would be possible to have more supervision of the handling of poultry at receiving points in order that the visibly diseased fowls could be rejected and destroyed at those points. Such an activity could probably include the tracing of the origin of many of these shipments. To complete the campaign will necessarily require considerable time, but if all of the different agencies who are interested in poultry and swine will keep the problem in mind and take whatever action they can to assist, it is hoped that a considerable improvement in the situation will be observed within a few years.

Your committee recommends that research work in connection with the study of tuberculosis in swine be continued, such work to include the typing of certain lesions of tuberculosis in swine found at abattoirs and, also, to determine whether hogs fed

on uncooked garbage and used for human food are responsible for spreading any type of tuberculosis.

CONCLUSIONS

In closing this report, your committee believes that the subject of bovine tuberculosis in this country must be given attention for a considerable time to come in certain localities; therefore, public funds must continue to be made available for this purpose and, in certain localities, more funds should be provided for the work in connection with the control and eradica-

tion of tuberculosis of the avian type.

The best results in animal tuberculosis eradication can not be obtained unless there is a proper application and interpretation of the tuberculin test. While this fact has been mentioned in previous reports of the Committee, it is deemed advisable to call attention to it again.

Respectfully submitted,

(Signed) A. E. WIGHT, *Chairman*.

H. A. SIEDELL,

C. U. DUCKWORTH,

T. H. FERGUSON,

W. H. FELDMAN.

Poultry Diseases

J. R. BEACH, *Chairman*

THIS COMMITTEE, like its predecessors, deplores the continued apathy of practicing veterinarians toward poultry-disease matters. It is difficult to understand why they are content to leave the handling of the disease problems of this important branch of the livestock industry to the salesmen and representatives of hatcheries and poultry feed and supply dealers. Surely, the veterinarian would not admit that he is less competent than these people who have no medical training.

If poultry-disease research is a function of the veterinary departments of colleges and experiment stations, why should the handling of poultry diseases on the farm be any less the function of the practitioner? The success that a few veterinarians have had in poultry practice is evidence that it can be made attractively remunerative. But, granting that as a "cash crop" it may not measure up to other phases of a general practice, the goodwill and favorable comment which would come from sound advice on poultry disease should pay good dividends in other ways. The advice, however, must be sound and not based on a snap diagnosis accompanied by prescribing a cure-all type of drug or biological product. Poultry diseases can not be handled any more effectively by such procedure than can

those of cattle or swine. The Committee feels that once a veterinarian has demonstrated that he is the most reliable source of information on poultry disease, it is to him that poultry owners will inevitably look for advice.

PARATYPHOID INFECTION IN CHICKENS AND TURKEYS

Outbreaks of paratyphoid infection in both chicks and turkey poults have become increasingly prevalent. The most common cause of the disease is *Salmonella aertrycke*, but a number of other species of *Salmonella* have been incriminated.

The disease in chicks may be acute or chronic. In the acute type, some birds die in four to five days, with the mortality peak at seven to ten days, after which it gradually subsides. The principal symptoms and lesions are droopiness, ruffled feathers, diarrhea, retained egg yolks, hyperemia of the naval, edema of the lungs and duodenitis. In the chronic type, losses occur between the ages of 5 and 25 days. Epicarditis and pericarditis, with the pericardial sac filled with a mushy, straw-colored exudate, and the ceca filled with firm, caseous plugs, are the common post-mortem findings. The disease is often traceable to incubator-acquired infection, in

which case it can usually be controlled by proper incubator sanitation and formaldehyde fumigation. Segregation of sick birds and elimination of rodents, which are possible carriers, are also essential.

In turkeys the disease presents a more serious problem than in chicks. In some cases entire flocks have been completely wiped out. The disease is acute, and common symptoms are ruffled feathers, droopy wings, inappetence and a thin, watery, foamy diarrhea. Poults between the ages of a few days to 5 weeks are affected. The more common lesions are duodenitis, hyperemia of the liver and kidneys, pericarditis with a serous fluid in the pericardial sac and abdominal cavity. The ceca are distended by a cheesy plug of coagulated fecal material, undigested feed material and epithelial debris.

Cross agglutination between *S. pullorum* and other organisms of the Salmonella group may detect some carriers in a breeding flock, but little dependence can be placed upon this as a control measure. Sanitation, especially that pertaining to incubators, is essential in controlling this disease. Some agglutination testing has been done with antigens prepared from other species of Salmonella. The practicability and value of this procedure, however, have not as yet been demonstrated.

The malady has a close resemblance to pullorum disease in many respects. It is important, therefore, that all suspected cases be confirmed by laboratory examination.

PULLORUM DISEASE

Pullorum disease control and eradication are making progress in this country. The national poultry improvement plan has stimulated an increasing interest in the use of the agglutination test and has emphasized the importance of uniform requirements and terminology. However, progress in the establishment of flocks free from pullorum infection might be expedited if the national plan were to take cognizance of the importance of basic disease-eradication measures, in addition to testing, which are vital in the control, eradication, and

prevention of infectious diseases. It should be realized, for example, that the most common avenue for the spread of pullorum infection in certain areas is custom and commercial hatcheries, and measures should be adopted which will reduce or eliminate the spread of the infection through such channels. It also should be realized that flocks once free from infection can be maintained in such status only by the enforcement of measures to prevent reintroduction of the infection.

Fowls other than chickens are becoming increasingly significant in the pullorum problem. Reports reveal that pullorum infection has become established in many flocks of turkeys in a manner very similar to that in chickens, and the testing of turkey-breeding flocks for pullorum infection is being practiced quite extensively. Some of the results thus far obtained, however, indicate that before a general program of testing is adopted, further study should be made of the antigen and diagnostic dilution to employ, the persistency of the reaction, and the cross-reaction with other members of the Salmonella group.

A recent mimeographed report from the United States Department of Agriculture states that 27 states which were coöperating in the national poultry improvement plan reported 4,638,822 birds tested under official supervision, of which 3.44 per cent were classified as reactors. The range in percentages of reactors among the states was 0.6 to 18.5 per cent.

The Eastern States Pullorum Disease Conference of Laboratory Workers reported the following testing results on chickens for the past two seasons:

	1937-38	1938-39
Number of flocks.....	7,878	9,565
Number of birds.....	3,410,429	4,121,456
Range in percentages of reactors	0.06-8.71	0.05-7.20
Number of 100 per cent tested, non-reacting flocks	3,144	3,818
Number of pullorum-clean flocks	1,412	1,609
Number of birds in pullorum-clean flocks	1,144,965	1,329,104

These results represent official tests conducted in Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire,

New Jersey, North Carolina, Ohio, Ontario (Canada), Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia.

EQUINE ENCEPHALOMYELITIS IN BIRDS

During the past year equine encephalomyelitis virus (eastern type) was identified in natural disease outbreaks among pheasants and pigeons for the first time. Three definitely positive cases were observed in Connecticut, Massachusetts, and New Jersey during September; suspicious cases were reported in Rhode Island. Serious losses were observed in some of the natural outbreaks. The natural occurrence of this infective agent among pheasants and pigeons strongly suggests that other birds also may be natural hosts of this disease. Further investigation in both field and laboratory is essential in order to evaluate properly the exact rôle that birds may play in the dissemination and perpetuation of these viruses. All who have contact with avian diseases should be on the lookout for further occurrence of the disease among birds.

AVIAN LYMPHOMATOSIS

Of major importance in the continued high adult mortality in chickens are the leucemic and aleucemic manifestations of disease variously designated as fowl leucosis, leukemia, visceral lymphomatosis, neurolymphomatosis (fowl paralysis), lymphocytoma, osteopetrosis, etc. Investigators fail to agree whether these various neoplastic-like disturbances are of singular or plural etiology, although the majority of workers believe that the causative factor or factors represent a filtrable ultramicroscopic virus or virus-like agent or agents. Theories that bacterial toxins may incite this group of disturbances have not been confirmed. Coccidia and other parasites are not directly responsible for the disease. Opinions that nutrition is a primary factor have gained little support. The contention that wheat germ oil has specific preventive and curative properties for fowl paralysis, as reported by Butler and Warren, has been disproved by the recent controlled work of several investigators.

Attacks on the universal problem of adult mortality by concerted research marks the present trend. Such a program is contemplated in Great Britain, and in this country a coöperative undertaking is already under way in the recent establishment of the Regional Research Poultry Laboratory. Twenty-five states in the region comprising the north central and northeastern group of states are coördinating their efforts to improve the viability of poultry. As the first essential, a program of investigation sufficiently broad to embrace various phases of fowl paralysis (lymphomatosis, leucosis, etc.) is being undertaken. The coöperative plan embraces a study of the pathological and genetical aspects of fowl paralysis and the influence of different management practices, nutrition and parasitism on the incidence of disease. The program is designed to facilitate close integration of the work done by the various states with that of the central laboratory.

DIFFERENTIATION OF RESPIRATORY DISEASES

Attention is directed to the fact that there exist three known respiratory infections, *viz.*, infectious bronchitis of chicks, infectious laryngotracheitis and infectious coryza, which may present similar symptoms and lesions. To add to the difficulties of diagnosis, there are other, and as yet unidentified, clinically similar respiratory involvements. Obviously, control measures can not be applied intelligently without a proper identification of the particular type of trouble that is present. In many instances this can not be done without the aid of laboratory facilities and inoculation of test chickens. The Committee considers it advisable that aid be freely sought in any doubtful case. This is of particular importance in deciding whether laryngotracheitis vaccination is indicated in cases of a suspected but not positively identified outbreak. To use this vaccine in cases of mistaken diagnosis would be unsatisfactory to both veterinarian and client and also would bring prejudice against one of the most effective disease-control measures that has been developed.

INFECTIOUS CATARRHAL ENTERITIS OF TURKEYS

During the past year, Hinshaw, McNeil and Kofoed have shown that a species of *Hexamita*, a protozoan parasite, is the etiological agent of the disease of turkeys commonly called intestinal trichomoniasis and that the two species of *Trichomonas* found ubiquitously in the ceca of turkeys have no pathogenic significance. The name trichomoniasis is, therefore, a misnomer, and the Committee recommends that the name infectious catarrhal enteritis, suggested by Hinshaw and McNeil, be accepted as the official name of the disease.

POULTRY-DISEASE NOMENCLATURE

In the report of the Committee for last year it was recommended "that the special Committee on Poultry Diseases for the next year be authorized to revise the nomenclature and present same at the next annual meeting of the Association."

For several years, the Northeastern Conference of Laboratory Workers has also felt the need of a check list of the diseases and parasites of birds. Accordingly, committees were appointed to compile complete check lists of diseases grouped on an etiological basis, as virus, bacterial, mycotic, protozoan. It also was planned that the committees would serve permanently and revise their check lists in accordance with new findings. These check lists have been prepared, but since the Conference lacks publication facilities, they are not available to persons who could make use of them.

For the special Committee on Poultry Diseases to compile a comparable list would be not only an impossibility but a needless duplication of effort. Therefore, it has seemed desirable for this committee to co-operate with the several sub-committees of the Northeastern Conference of Laboratory Workers and endeavor to obtain publication of the lists already prepared by the latter group.

The Committee realizes that the lists are probably too voluminous for publication at one time but considers it practicable and highly desirable that one be published this year, and one other during each succeeding

year, until all have been published. A list once published would be kept up to date by the publication of additions or corrections from time to time. In this manner a complete, periodically revised poultry-disease nomenclature could be made available to everyone. In accordance with this view, a list of the virus diseases is hereby submitted with the recommendations that it be published as a part of the Committee's report and that a limited number of reprints be made and offered for sale to the various libraries and individuals who will undoubtedly wish them for their files. It is also recommended that a check list of the bacterial diseases be published next year. Finally, it is recommended that certain members of the present committee be retained and instructed to work with the Conference.

Respectfully submitted,

J. R. BEACH, *Chairman*.
C. D. LEE,
HENRY VAN ROEKEL,
C. A. BRANDLY,
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EXPLANATION OF CHECK LISTS OF VIRUS DISEASES

The name which appears first is the preferred name; those following are synonyms and foreign names. The list of susceptible species includes those which acquire the disease naturally as well as those which have been infected experimentally. The inclusion of species experimentally infected appears extremely important because this gives workers a clue to species in which natural outbreaks might ultimately be expected. For example, Remlinger and Bailly determined that some birds are susceptible to equine encephalomyelitis virus and the experiences of the past year show that this infection can occur naturally in birds. Finally, references are cited whenever it is deemed necessary so that interested workers can refer to the information available.

With reference to the pock diseases, it should be explained that our present knowledge does not permit an adequate classification. Usually, three types of virus are recognized, *viz.*, fowl, pigeon and passerin (as exemplified by Kikuth's canary virus),

but evidence is accumulating to indicate that there are differences within some of these strains. Thus, some claim that Kikuth's virus is apathogenic for chickens, while others find that some canary strains are infectious for chickens. Moreover, some claim that infection of the chicken with canary virus gives immunity to both fowl and pigeon virus, while others do not find this to be the case. Ultimately, however, the question may be settled by determining whether a given strain is mono, bi or tri-pathogenic and classifying it accordingly without reference to host origin. In the

list that follows, the pox virus is listed according to the host with the species in which it occurs or to which it has been transmitted.

It seems advisable to include all species of birds, since many infections are not limited to domesticated birds. Some infections occur most often in domesticated species and only occasionally in wild species, while in other cases the reverse is true. Thus, in order to get a clear picture of the epizootiology of a disease, all species (in many cases even mammals) must be considered.

Virus Diseases of Birds*

Diseases

1. Fowl plague
 - Bird plague
 - Fowl pest
 - Bird pest
 - Höherpest (Gr.)
 - Vogelpest (Gr.)
 - Kyanolophia gallinarum (1)
 - Braunschweiger (Geflügelseuche)
 - or Hühnerseuche (2) (Gr.)
 - La peste aviaire (Fr.)
 - La peste aviaire (It.)
 - Peste aviar (Sp.)
 - Exudative typhus (3)
 - Epizootic peritonitis (4)
 - Epizootic pericarditis
 - Macfie (13) and Adler (14) disease
 - Leucocytic inclusion disease (15), (16), (17), (18)
2. Plague of Blackbirds
3. New Castle disease (20)
 - Pseudo fowl pest (21)
 - Philippine fowl disease (22)
 - Avian pest (23)
 - Ranikhet disease (24)
 - Korean poultry disease (25)
 - Madras fowl pest (31)

Susceptible Species

1. Chicken
 2. Turkey (5), (10 Exp.)
 3. Pheasant (6), (8 Exposure)
 4. Goose (8), (7 Exp.), (10 Exp.)
 5. Duck (9), (5 Exp.), (10 Exp.)
 6. Guinea fowl (5 Exp.), (10 Exp.)
 7. Cockatoo (*Kakatos rosalba*) (11 Exposure)
 8. Pigeon (5 Exp.)
 9. Sparrows (12 Exp.)
 10. Kites (12 ?)
 11. Crows (12 ?)
 12. Falcons (12 ?)
-
1. Blackbird (*Turdus merula*) (19)
 2. Blackbird (*Turdus viscivarus*) (19)
 3. Blackbird (*Turdus pilaris*) (19)
 4. Other species of blackbirds (19)
 5. Starling (*Sturnus vulgaris*) (19)
 6. Falcon (*Falco tinnunculus*) (19 Exp.)
 7. Owl (*Strix bubo*) (19 Exp.)
 8. Sparrow (19 Exp.)
-
1. Chicken (20), (23)
 2. Turkey (23)
 3. Guinea fowl (23)
 4. Duck (20), (21), (22), (23) (All Exp.)
 5. Goose (21 Exp.), (22 Exp.)
 6. Pigeon (20, 21, 23) (All Exp.)
 7. Crow (21 ?)
 8. Parrot (21 ?), (23 ?)
 9. Sparrow (21 ?)
 10. Three varieties of wild birds, one belonging to the mayas, one to the martins and one not identified (23 Exp.)

*For the purposes of this tabulation—to facilitate the reading of the extensive lists presented—the customary italicizing of genus and species has been abandoned.

4. Infectious bronchitis (26-29)
 - Chick bronchitis
 - Gasping disease
 - Bronchite infettiva (It.)
 - Bronquitis infecciosa (Sp.)
5. Infectious laryngotracheitis
 - Infectious bronchitis (32)
 - Infectious tracheitis (33)
 - Tracheo-laryngitis (34)
 - Infectious tracheitis (35)
 - Canadian flu
 - Gasping disease
 - Laryngotracheite infettiva dei polli (It.)
 - Laringotraqueitis infecciosa (Sp.)
 - Laryngo-tracheite (Port.)
6. Infectious bronchitis of quail
 1. Quail (30 A)
7. Psittacosis
 - Parrot fever
 - Psittakosis (Gr.)
 - Psittacose (Fr.)
 - Psittacosi (It.)
 - Psitacosis (Sp.)
 - Psitacose (Port.)
 1. Shell parakeets (*Melopsittacus undulatus*) (36)
 2. Tovi parakeet (*Brotogeris jugularis*) (36)
 3. African parakeet (*Poicecephalus senegalus*) (36)
 4. Blue-fronted Amazon (*Amazilia aestiva* L.) (36)
 5. Short-tailed parrot (*Graydidascalus brachyurus* Temminck & Kuhl) (36)
 6. Parrotlet (*Psittacula conspicillata* Lafresnaye) (36)
 7. Parrotlet (*Psittacula spengeli* Hartlaub) (36)
 8. Conures (*Conurus solstitialis*) (36)
 9. Petz conures (*Eupsittula canicularis* L.) (36)
 10. Petz conures (*Eupsittula cacorum*) (36)
 11. Petz conures (*Eupsittula pertinax aeruginosus*) (36)
 12. Indian ring-necked parakeet (*Psittacula torquata*) (36)
 13. Orange-bellied grass parakeet (*Neophema chrysogastra* Lotham) (36)
 14. Quaker parakeet (*Myiopsitta monachus* Boddaert) (36)
 15. Australian parrot (*Psephotus haematontus*) (74)
 16. Australian parrot (*Trichoglossus chlorolepidotus*, T. moluccanus) (74)
 17. Australian parrot (*Leptolophus hollandicus* Kerr (74) (36) Cockateel
 18. Parrot (*Kakatoë galerita*) (?) (74)
 19. Parrot (*Kakatoë roseicapilla*) (?) (74)
 20. Parrot (*Platycercus elegans*) (?) (74)
 21. Parrot (*Platycercus adelaidae*) (?) (74)
 22. Parrot (*Platycercus adscitus*) (?) (74)
 23. Parrot (*Platycercus eximius*) (?) (74)
 24. Parrot (*Platycercus icterotis*) (?) (74)
 25. Parrot (*Barnardius semitorquatus*) (?) (74)
 26. Parrot (*Neophema elegans*) (?) (74)
 27. Java rice birds (*Padda oryzivora* L.) (36)
 28. Canary (*Serinus canaria*) (36)
 29. Bullfinch (*Pyrrhula vulgaris*) (36)
 30. Nonpareil (*Cyanospiza ciris*) (36)
 31. Bengalese (*Uroloncha acuticauda*) (36)
 32. Pekin robin (*Liothrix luteus*) (36)
 33. Fowl (*Gallus gallus* L.) (36 Exp.)
 34. White mice (36, 37)
 35. Guinea pig (38)
 36. Rabbit (38)
 37. Monkey (*Macacus rhesus*) (39)
 38. Man
 39. Stormy petrel (88)

8. Pseudo psittacosis
Avian psittacosis
Disease of Pacheco and Bier (40-42) and Meyer (43-44)
 1. Parrot (*Amazona amazonica*)
 2. Parrot (*Amazona farinosa*)
 3. Parrakeet (*Brotogerys tui*) (40-44)
 4. (*Amazona aestiva*) (81)
 5. (*Aratinga cactorum*) (81 Exp.)
 6. *Psittacula passerina* (81 Exp.)
 7. (*Aopus chopi* Vieill.) (?) (81 Exp.)
 8. (*Spinus ictericus* Licht.) (?) (81 Exp.)
 9. (*Sporophila superciliaris* Cab.) (?) (81 Exp.)
 10. Canary (*Sicalis flaveola* Licht.) (?) (81 Exp.)
 11. Very young chicks (45 Exp.)
9. Virus disease of owls
 1. Great-horned owl (*Bubo virginianus*) (53-54)
 2. Screech Owl (*Otus asio*) (54 Exp.)
10. Rabies
Tollwut (Gr.)
Rage (Fr.)
Lyssa
Rabbia (Sp.)
Raiva (Port.)
La rabbia (It.)
 1. Chicken (49-50), (46-47 Exp.) (48 Exp.), (51-52 Exp.) (92 Exp.)
 2. (*Buteo vulgaris*) (48 Exp.)
 3. (*Bubo bubo*) (48 Exp.)
 4. Pigeon (48 Exp.) (92 Exp.)
11. Pseudo-rabies
Aujeszky's disease
Peste de caçar (Port.)
 1. Chicken (73 Exp.)
 2. Pigeon (73 Exp.)
12. Equine infectious anemia
Infektiöse Anämie der Pferde (Gr.)
L'anémie infectieuse des chevaux (Fr.)
Anemia infecciosa de los caballos (Sp.)
Anemia perniciosa equina (Port.)
 1. Chicken (56-57 Exp.)
 2. Pigeon (?) (57 Exp.)
13. Avian encephalomyelitis (95)
Epidemic tremor
 1. Chicks (87) (95)
14. Equine encephalomyelitis
Argentine Strain:
Pferde encephalomyelitis (Gr.)
L'encephalomyélite des chevaux (Fr.)
Encefalomiélitis equina (Sp.)
Eastern Type:
 1. Pigeon (58-59 Exp.)
 2. Goose (*Anser cireneus*) (58 Exp.)
 3. Duck (*Anas boschas*) (58 Exp.)
 4. (*Circus rufus*) (58 Exp.)
 5. (*Turdus merula*) (58 Exp.)
 6. Stork (58 Exp.)
 1. Chicken (90 A Exp.)
 2. Pheasant (89) (90) (90 Exp.)
 3. Pigeon (91)
 4. English sparrow (*Passer domesticus*) (90 Exp.)
15. Herpetic encephalitis
 1. Pigeon (60 Exp.)
 2. Goose (61 Exp.)
16. Leucemia
Leukämie (Gr.)
Leucémie (Fr.)
Leucemia (Port. & Sp.)
 - a. Fowl
 1. Chicken
 2. Chicken-pheasant hybrid (62 Exp.)
 - b. Turkey
 1. Turkey (63)
 - c. Canary
 1. Canary
17. Lymphomatosis (neuro and visceral)*
Mareksche Geflügellähme (Gr.)
Geflügellähme (Gr.)
Lymphomatose des gallinacés (Fr.)
 1. Chicken

*Tentative classification. Virus nature of the disease not definitely proved.

Paralisi dei polli (It.)
 Linfomatosis de las gallinas
 (Sp.)
 Linfomatose (Port.)
 Fowl paralysis
 Range paralysis
 Iritis

Classified

- | | | |
|--|---|--|
| 18. Avian pox
Fowl pox
Bird pox
Canary pox
Avian diphtheria
Avian molluscum (93)
Geflügelpocken (Gr.)
Variole aviaire (Fr.)
Viruela aviar (Sp.)
Difteria aviar (Sp.)
Bouba (Port.) | a. Fowl | 1. Chicken
2. Turkey (68), (70)
3. Pheasant
4. Quail (65)
5. Partridge (64)
6. Pigeon (adaptable) (67 Exp.)
7. Canary (76 Exp.) |
| | b. Turkey | 1. Turkey (75)
2. Fowl (75 Exp.)
(some strains not infectious for chickens (101). |
| | c. Pigeon | 1. Pigeon
2. Fowl
3. Turkey (70 Exp.)
4. Canary (75 Exp.)
5. Sparrow (75 Exp.) |
| | d. Canary: | 1. Canary
2. Sparrow (76 Exp.)
3. Pigeon (76 Exp.) |
| | 1. Kikuth strain | |
| | 2. Reis and Nobrega (63)
from canary (<i>Serinus canarius</i>) and (<i>Sporophila</i>) | 1. Canary (63) but not pathogenic for fowl or pigeon |
| | 3. Reis and Nobrega (94)
from canary (<i>Serinus canarius</i>) | 1. Canary (<i>Sicalis flaveola</i>) (94 Exp.)
2. <i>Oryzoborus angolensis</i> (94 Exp.)
3. <i>Sporophila</i> sp. (94 Exp.) but not pathogenic for (<i>Cyanocompsa cyanea</i>) sparrow (<i>Passer domesticus</i>) chicken and pigeon. |
| | 4. Reis and Nobrega (94)
from canary (<i>Serinus canarius</i>) and (<i>Sicalis flaveola</i>) | 1. Canary
2. Pigeon (94 Exp.)
3. Chicken (94 Exp.) |

Not Classified

- | | |
|--------------|---|
| e. Partridge | 1. Partridge (77)
2. Pigeon (77 Exp.)
3. Chicken after passage in pigeons (77 Exp.) |
|--------------|---|

f. Bunting sparrow

1. Bunting sparrow (78) (79)
2. Canary (79-80 Exp.)
3. Sparrows (79-80 Exp.)
4. Chaffinches (79-80 Exp.)

1. Crow (96)
2. Guinea (97)
3. Parrot (98)
4. Bullfinch (*Pyrrhula vulgaris*) (99)
5. Grouse (100)

19. Lymphomatosis - myelocytomatosis - endothelioma

20. Trachoma

21. Rous' sarcoma No. 1
Roussarkom (Gr.)
Sarcome de Rous (Fr.)
Sarcoma di Rous (Sp.)

1. Chicken (71)

1. Chicken (72)

1. Chicken (82)
2. Turkey (83 Exp.)
3. Guinea fowl (84 Exp.)
4. Pheasants (85 Exp.)
5. Pigeon and duck embryos (86 Exp.)

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Resolutions of the Executive Committee of the Ohio State Veterinary Medical Association*

We, the Executive Committee of the Ohio State Veterinary Medical Association, assembled in regular session at Columbus, Ohio, this 27th day of September, 1939, to consider a plan of coöperation with the Farm Security Administration and the licensed veterinarians of Ohio; knowing that the Farm Security Administration of the United States Department of Agriculture is charged with the responsibility of rehabilitating low-income and destitute farm families who are in need of aid, and can not obtain credit from any other source; knowing further that the families

*This is a model agreement approved for publication by the Executive Board of the A.V.M.A. in order that it may serve as a guide for other states or groups.

who are clients of this Farm Security Administration in the State of Ohio are and have been residents of this state for some time and now, whenever needing veterinary medical services for their live stock, are dependent upon licensed veterinarians performing veterinary medical services within this state, which may be made more effective by close coöperation between the licensed veterinarians of Ohio and representatives of the Farm Security Administration, hereby approve the broad principles set forth in the attached statement of policy of the Ohio State Veterinary Medical Association and hereby recommend this policy to licensed veterinarians in the State of Ohio who desire to coöperate with the Farm Security Administration in putting into effect a veterinary medical service program in any county in this state.

(Motion by W. F. Guard of Columbus; seconded by H. E. Ash of Bowling Green.)

(Signed) R. E. REBRASSIER,

Executive Secretary.

STATEMENT OF POLICY OF THE OHIO STATE VETERINARY MEDICAL ASSOCIATION CONCERNING THE VETERINARY MEDICAL PROGRAM FOR THE FARM SECURITY ADMINISTRATION CLIENTS IN OHIO

The Ohio State Veterinary Medical Association will coöperate with and assist the Farm Security Administration in an effort to supply Ohio clients of that administration with adequate veterinary medical services and will recommend further coöperation by the individual veterinarians throughout the State of Ohio, providing the following principles are accepted and adhered to by the Farm Security Administration.

Any program to provide veterinary medical services for the clients of the Administration in Ohio shall include the following basic features:

1) Such service will be made available only to those low-income farm families who are borrowers (clients) of the Farm Security Administration.

2) The supervisor in each local unit of the Administration shall notify and call a meeting of all the licensed veterinarians in the area. At this meeting a veterinary

medical service program shall be discussed and all of the veterinarians in that area signifying their willingness to assist in the program shall constitute a veterinary medical service committee. Negotiations for the formation and administration of a veterinary medical service program shall be carried on by and between said committee and representatives of the Administration.

3) Control of the veterinary medical services to be rendered and the extent of the cooperation on the behalf of the veterinarians shall be exclusively in the hands of said committee. Each eligible client shall have the right to select his own veterinarian from the list of doctors who have agreed to assist in the program and each veterinarian shall have the right to accept or reject any individual client.

4) The said committee shall advise the supervisor of the Farm Security Administration of the veterinarians who have agreed to participate in the veterinary medical service program. The supervisor in turn will present said list as rapidly as possible to eligible clients so that each may select his own veterinarian.

5) The veterinary medical services provided by cooperating veterinarians shall include all farm services ordinarily provided by a licensed veterinarian, including farm and office care, obstetrical cases, immunization, and ordinary drugs, but not including hospitalization or costly drugs or vaccines or serums.

6) Each participating veterinarian shall have the right to use his own judgment in respect to fees, keeping in mind the character of the services rendered and that the eligible clients under the program are in the low-income group having Administration loans.

7) Funds loaned by the Administration for veterinary medical service to participating clients shall be held in trust by a trustee selected by said committee with the approval of the state director or his duly appointed representative. The trustee will provide ample surety bond which shall be approved by the Administration.

The trustee will promptly notify all participating veterinarians as to the name

and address of each client who has deposited the proper amount in the fund. Also, each participating veterinarian should be notified as to the amount deposited by each client. Likewise, each participating veterinarian should be notified when any client withdraws from the program.

8) The amount of funds to be deposited by each participating client for veterinary medical service shall be determined on the basis of the total number of animal units owned or leased by said client and the ability of the client to pay. The ability of the client to pay will be determined by his anticipated income as indicated in his farm and home plan.

9) Funds for veterinary medical services will be deposited by the clients with the trustee. The trustee will use these funds for payment of veterinary medical services furnished by veterinarians, according to the provisions of paragraph 5. The trustee will advise the committee of funds available for payment of bills incurred in each quarterly period. Veterinarians rendering services will submit to the trustee all bills promptly, including complete statements of services rendered to the live stock owned or leased by clients.

These statements will be reviewed and approved by said committee or its subcommittee, and paid by the trustee on a percentage basis of the funds available. (It is suggested that the county FSA supervisor attend as ex-officio and that the committee secure his assistance whenever possible.) If in any quarterly period there are more funds available than necessary to pay outstanding bills, a surplus fund will be created for that year. This surplus shall be applied at the end of the year as follows: First, on a pro-rata basis to all bills which were reduced during any of the quarterly periods; second, in the event that there is any surplus remaining after all bills have been paid in full, the same shall be credited or returned to the participating clients on a pro-rata basis to the funds deposited by each participating client.

10) The Association believes that it is advisable for each participating client of the Farm Security Administration to have

his veterinarian make an annual farm-inspection visit on all live stock and poultry owned or leased by the client. It is suggested that the veterinarian, when making such a visit, give any technical or professional advice that will improve or help to maintain the health conditions of said live stock or poultry.

The matter of having an annual farm-inspection visit shall be preferential with the client and the veterinarian will not make the visit unless called by the client, who must be present when said visit is being made. It shall be understood that the veterinarian may follow veterinary medical prerogatives similar to those exercised when rendering any type of veterinary medical service.

11) A participating veterinarian should feel free to discuss matters with any client who has misused his services or abused the privilege of securing services under the program. In case of continued misuse or abuse, the veterinarian may present his statements, in writing, to the chairman of the veterinary medical service committee and forward a copy of his statement to the supervisor of the Administration in the respective area. These statements shall be considered by a committee on safeguards consisting of a veterinarian selected by participating veterinarians from their group, the chairman of the county FSA advisory committee and a third party selected by these two individuals. The latter person shall act as chairman of this special committee. If this special committee finds sufficient justification in the veterinarian's statements, it shall inform the client that he is no longer eligible to receive veterinary medical services under the program, and instruct the trustee to return the unused portion of said client's funds to him, provided that these funds have not been borrowed from the Administration; otherwise, the unused portion shall be returned to the proper source.

It is also suggested that in case of any controversies between the client and his veterinarian concerning the operations of the program, such matters shall be stated in writing to the committee on safeguards

for adjudication and that, in cases of continued dissatisfaction, these will be reported to the Executive Board of the Ohio State Veterinary Medical Association for its consideration.

12) Any veterinarian participating in the program shall have the right at any time to request that his name be removed from the list of participating veterinarians. This information shall be transmitted by the trustee to all clients who have selected the retiring veterinarian.

13) Any client participating in the program shall have the right at any time to request, in writing, that his name be removed from the list of participating clients. This will not interfere with the veterinarian's securing settlement on bills for professional services rendered while the client was participating in the program. The trustee shall notify all participating veterinarians of the client's withdrawal from the program.

14) Inasmuch as there is very little precedent to follow in developing the program, it is the desire of the Association to be kept informed, and to assist in any way that will promote the success of the program. It is suggested that conferences be held whenever deemed necessary by the veterinary medical service committee or representatives of the Farm Security Administration, to modify the program to meet new and unforeseen conditions and situations.

Statistics on Dog Breeding

It is estimated that the number of commercial breeders of purebred dogs is 40,000; the number of purebred bitches regularly bred to produce puppies for sale, 120,000; the number of litters ($1\frac{1}{2}$ per bitch), 180,000 per year; and the number of pedigreed puppies whelped alive, 900,000. Of the latter, about 15 per cent die during the first two weeks of life.—*Statistics by Will Judy, quoted in "Canine Pediatrics."*

There are 822,000 species of animals, and approximately 1,500,000 species of plants.

EDITORIAL

What is the object of medical education? It is to enable the practitioner, on the one hand, to prevent disease by his knowledge of hygiene; on the other hand, to divine its nature, and to alleviate or cure it, by his knowledge of pathology, therapeutics and practical medicine.—Thomas Henry Huxley, 1876.

Preventive Vaccination of Dogs Against Rabies from the Standpoint of Public Health*

AT THE 1939 meeting of the Hungarian association of hygienists, N. Kerbler reported on the results of preventive vaccination of dogs against rabies. In the following, we are publishing the salient features of the report, which was received with a great deal of interest.

The propagation and transmission of the virus of rabies may be attributed primarily to carnivorous animals, especially to the characteristic habits of the dog and the peculiar behavior of rabid dogs.

England has been free of the infection since 1903. In 1918, the disease was introduced by breaking the strict quarantine regulations through smuggling dogs into the country in airplanes. Through an infected dog, the disease had spread to such an extent that, in the following year, 150 cases developed in 14 counties. To what extent a single dog may be responsible for such disaster and the extent of the territory which may become involved are proved by numerous observations made in our country. However, the illustration in England furnishes proof that it is almost impossible to prevent the introduction of rabies from infected countries. The most effective means for prevention, therefore, is the prophylactic vaccination of dogs.

Since the introduction of prophylactic immunization, losses from rabies in exposed humans and animals have greatly diminished. Prior to the immunization, the percentage of deaths occurring from bites of rabid animals, according to the statistics

of Hogyes, was 13.91. After the introduction of vaccination in Hungary, there were still 40 deaths in 1907 and, in 1908, 49 persons were victims of this dreadful disease. Among persons receiving complete immunization in the Pasteur Institute of Budapest in the years 1890 to 1908, 394 persons died of rabies; from 1909 to 1927, the number of deaths was 312; from 1928 to 1938, 28; in 1937, only four cases of rabies occurred; and, in the past year, only one death was reported.

The reporter then described the preventive vaccination with special reference to the procedure developed by the Japanese investigators, Umens, Doi, and Kondo, consisting of the single-injection procedure. It is apparent that immunization of dogs on a large scale, especially compulsory vaccinations, should be made practical and, if possible, with the single injection. The difficulties of such vaccinations in Hungary were soon eliminated and, likewise, the preparation of a potent vaccine, according to the original method, in large quantities was assured.

The immunity lasts for about one year; therefore, it must be repeated annually. In the past five years, in Hungary, approximately 1,500,000 doses of the vaccine were used and, in spite of this large number, vaccination from the public health standpoint was without the least danger. The isolated occurrences of encephalomyelitis (1 to 2 per cent occurring after vaccination) were observed usually in overbred, degenerated dogs, and they did not contribute to the spread of the disease.

The voluntary prophylactic vaccination

*For this editorial contribution, the JOURNAL is indebted to A. Eichhorn, D.V.S., director of the Animal Disease Station, National Agricultural Research Center, Beltsville, Md.

of dogs in Hungary commenced in 1929. The compulsory vaccination of sheep herders' dogs was inaugurated in 1934 and, in 1935, compulsory vaccination in the various sections was officially ordered. Since then, it has been gradually extended to the entire territory of the country: In 1935, to the City of Budapest and its vicinity; in 1936, to the territory west of the Danube; in 1937, to the County of Pest; in 1938, to the northern counties; and, in 1939, to the southeastern counties. The territories which have been returned to the post-war Hungary will be included in the compulsory vaccination program very shortly.

The results of the prophylactic vaccination of dogs are as follows: Budapest had been constantly infected for many decades. In 1933, the disease was established there in 70 dogs, and 1,529 persons were obliged to take treatment in the Pasteur Institute. In 1936, following the compulsory vaccination, the disease was diagnosed in only three dogs. In 1938 and 1939, not a single case occurred. In the same area the number of persons vaccinated was reduced to 413, and these vaccinations were carried out only as safety measures. Not in a single instance was it established that the animals in question were rabid.

In the western counties of the Danube, in 1933, the number of cases of rabies in domestic animals was still 473, and 1,643 persons and 1,598 domestic animals were subjected to the post-infection vaccination. After the compulsory vaccination of dogs in 1937, the number of rabies cases in dogs dropped to 9; in 1938, only one case developed and, in this instance, it was established in a dog which had crossed the border from a neighboring country. In the County of Pest, prior to 1933, rabies was diagnosed in 231 animals, whereas, in 1938, only a single case developed.

Therefore, experiences gained in more than three-fourths of the country have proved that in the localities where compulsory vaccination was undertaken the disease subsided within a short time. Where the disease did appear, it occurred in dogs or cats which had not been vaccinated or other animals which had come from adjacent

countries. However, along the seriously exposed border of the country, the disease which was introduced did not spread because the bitten dogs had been immunized and, therefore, did not develop the disease as it had occurred in England.

According to Dr. Kerbler, the restrictive and quarantine measures are not rendered superfluous by vaccination. As a matter of fact, there should be no relaxation in their enforcement, especially with regard to stray dogs, which can not be controlled in any other manner. Finally, the author concludes as follows:

With the inauguration of the preventive vaccination of dogs, the history of rabies control attained a new chapter. The inauguration of the new preventive measures brought excellent results—as a matter of fact, beyond expectation—and is outstanding in its achievement. In the United States and in countries where the procedure was first developed, the results were not as striking. As a matter of fact, in some of the oversea countries the prophylactic vaccination of dogs was disappointing. It is probable that in the immediate future the compulsory vaccination of dogs will be extended to the newly acquired territories of Hungary, and we are justified in expecting that the disease will be eradicated from the entire country and will remain thus as long as the compulsory vaccination is carried out.

With the elimination of rabies in dogs, the immunization of man will also become superfluous and our country will be in position to boast that the danger from this dreadful disease has ceased to exist. If, on the other hand, the disease will be controlled in the neighboring countries and there is no danger of its reintroduction, there is hope that even without vaccination we can be freed from the dreadful disease which prevailed in our country for many centuries.

The vaccinations reported by Dr. Kerbler were carried out under official supervision and, therefore, the results should be regarded as authentic. It would be very desirable to learn the exact method of preparing the vaccine used in that country and, also, if it is produced by the government and distributed to the veterinary organizations for vaccination purposes. Likewise, it would be profitable to inquire as to the age limit of the vaccine, dosage, etc., since

the policies in this respect might offer a clue to the diverse results reported in the United States.

In a recent conversation with Dr. Lapine of the Pasteur Institute, the writer was informed that two injections of the rabies vaccine employed in France and northern Africa had given entirely satisfactory results. Therefore, it is obvious that the procedure of preventive vaccination of dogs can not be without definite merit.

Animal Experimentation and the Veterinary Profession

THE VETERINARY profession is maintained principally to conserve property. To be effective in that rôle it must be made up of practical men. Impractical men would not remain long on its roster. In the language of the street, the veterinarian must deliver the goods, or pass on to other pursuits.

The purpose of animal experimentation is precisely the same except that its function is to save human life also. In that capacity it is the travail of the medical profession. The veterinary service defends it as a salvage unit of tremendous importance to mankind.

When the season's output of the cornfield, for example, is threatened by a sweeping plague of the hog lot, the veterinarian is more apt to celebrate than to condemn the experimental work that made possible the saving of the year's income of his clients. The kind of sentiment that would have prevented Dorset, Niles and McBryde from tail-bleeding a few hogs in the quest for the cause of cholera could hardly make much impression on the minds of the farmer and his veterinary advisor. Both are practical men not easily swayed from common sense.

The wholesale suffering in the barnyard and the despair that the losses can bring into the farm home may be scoffed in the interest of compassion for animals by opponents of animal experimentation. But, there is little that is humane for man or for animals in the sentimentality that would expose the present population of our

country to the vicissitudes of the epizootics which medical research has removed. Undernourishment, pestilence, poverty, and widespread suffering are the wages the people will earn for yielding to the doctrines of a manifestly ill-conceived sentiment for laboratory animals.

Only those completely unaware of the potentiality of disease oppose the resort to experimentation on a few animals to save the millions of them required to insure our country an amplitude of food in any emergency. The opponents of animal experimentation, sincere as their compassion for laboratory animals may be, are NOT patriotic, not now at least, when the world is boiling over in conflicts which are exposing the shortage of the provisions man needs to carry on.

Veterinary Service of the Farm Security Administration

ELSEWHERE (page 623) in this issue is a model contract that may be entered into between the federal government and veterinarians engaged to supply veterinary service to farmers to whom money has been loaned by the government for the purpose of purchasing farm equipment and farm animals.

The document is the model compiled and agreed upon by the Ohio State Veterinary Medical Association and representatives of the Farm Security Administration in that state. It was submitted to and approved by the Executive Board, who ordered it printed for the edification of veterinarians of other states.

The debates over the kind of agreement veterinarians can afford to make for this type of contract service have been numerous, heated, and have never before ended in a manner satisfactory to both parties. From the report of our Ohio colleagues, made verbally before the Board, it seems that the government even more than the veterinarians has been groping for a competent solution to this problem. The Ohio plan is probably that solution, as it was studied at length by both sides before adoption.

Reflections of the Memphis Session

To clarify the actions taken at the annual meeting the contents of the October issue pertaining to the business sessions will be discussed editorially from month to month.

A FAULT commonly pointed out by members is the lack of information published in the JOURNAL on the work of the Executive Board and House of Representatives, two bodies elected by the most popular method the mind could contrive. The 13 members of the former are chosen either by mail ballot or by election at an annual meeting. The members of the latter are chosen by the component state associations. To these are added two additional members, one appointed by the director of the veterinary corps of the United States Army and one by the Bureau of Animal Industry, United States Department of Agriculture.

These two bodies are the voice of the veterinarians of North America. Their acts are, or at least should be, governed by those who elect them. If not truly representative, the fault lies in the electors—more properly speaking, in the newness of organized veterinary medicine, which has not yet reached its full stature in administrative efficiency. Too few members realize the power of their vote and entirely too few are not members at all.

The solution rests in the interest the graduates of the veterinary colleges take in the collective work. If that interest is incidental and sketchy, the fault will correct itself only when the associations grow stronger.

The national association furnishes the medium and the veterinarians the means, not only by their patronage but also by the amount of interest they take in their profession. If any veterinarian, in any position whatsoever, is of the opinion that he is an independent figure entitled to protection he does not help to support, he is surely mistaken, and if many were of the same mind, the whole veterinary service would sink to an unfortunately low level.

There is no place in our development at the present time that more clearly shows the lack of interest in the mechanism of association work than the existing mis-

understanding of the Executive Board and House of Representatives. Keeping in mind the method of election and the fact that every act of the former is subject to the approval or disapproval of the latter, the question of who rules the Association is answered.

The members of the Executive Board, chosen in true democratic fashion, delegate a Board of Governors of three to act for it between meetings in order that the Association may have a governing body all of the time. These three executives are the president, president-elect and the chairman of the Executive Board. Heretofore, everything was left to the entire Board. But, inasmuch as the Board meets only twice a year for a short period of time, it can not intelligently attend to the multiple details of office administration. As Chairman Jakeman declared, "A 'three-man board' is better than a one-man setup," which was inevitable under the former plan. Criticism of the "three-man board" to keep command the year around is the type of misunderstanding these editorials are intended to clarify.

One of the questions brought up at the Memphis session was the salaries of the employees of the central office. This is easily answered by saying that the payroll is less than it was in former years.

The Association is laboring under tremendous expense without increasing the dues. The increment is due to the increase by two thirds in the size of the JOURNAL and, in words, by about three fourths. The increased expense shows on the bills for printing, cover and body stock, illustrations, graphs and tables, mailing, and editorial work. The Board of Governors urges the Association to go forward, not backward, with its publicity and literary undertakings.

Finally, remember that the Association is yours and that the official organ with its increased capacity is an open outlet for

your council. The cost of membership is the same as it was when the JOURNAL was much smaller.

Speakers for Student Chapters

AMONG the projects (in the making) of the Association is the plan to furnish, at its own expense, from time to time, speakers for the student chapters of the various colleges. The object is to mobilize the talent of the country for the benefit of student bodies. Speakers who have attained eminence in their branch of the service, agreeable to the deans, will be chosen for this commission. At the present time a list of such experts is being compiled and their consent to act in that capacity is being obtained. During the present college year the Association hopes to carry out the wishes of the Board of Governors in this connection with the object of rendering aid to our educational system and to the students.

The world of science has become broad and each of its divisions has outstanding experts whose knowledge is lost in the maze of scientific activities. To bring these men before student bodies and before teaching staffs, if they wish to participate, is believed to be a step in the right direction. The pattern is not ours. It is the custom of the hour in the American colleges, and one the veterinary profession should not for long overlook in its march upward.

All the Association asks for this service is that the students keep informed on what is happening in the domain of veterinary medicine by reading the JOURNAL and, upon graduating, consider favorably the idea of participating in the work of organized veterinary medicine.

Women's Auxiliary

THE WOMEN'S Auxiliary of the American Veterinary Medical Association has been incorporated under the corporation laws of Illinois and its central office will henceforth be at 221 North La Salle street, Chicago, where all business matters will be transacted by the Association's executive secretary. The charter, which was granted by

the Illinois secretary of state to the auxiliary, a non-profit corporation, is now in the hands of the recorder of Cook county (Ill.). This and the new administrative by-laws formulated at the Memphis meeting will be published in an early issue together with suggested plans for enlarging the membership and usefulness of this important component of the veterinary profession.

The general plan comprises the organization of state units corresponding to the affiliated state and provincial societies which make up the A.V.M.A.

Dogs and Canine Medicine in the Eyes of the Law

A BRIEF REVIEW of a booklet entitled "Laws About Dogs" turns the mind to problems of the small animal branch of the veterinary profession that are manifestly of more vital importance just now than dog food supervision, laudable as that project may be.

Up to the present time the federal government has passed no laws concerning dogs. A Supreme Court ruling handed down in 1896 and approved again in 1920 declares that in the eyes of the law, dogs have the same status as wild animals; *ferae naturae*, the decision reads. This high ruling goes on to say that while the right of property regarding domestic animals is "perfect and complete, laws for the protection of domestic animals have but a limited application to dogs. . . . The very fact that they are without protection of the criminal laws shows that property in dogs is of imperfect and qualified nature." Faced with this very decision, not long ago, an eminent Chicago judge, in ruling on an alleged violation of the veterinary practice act, stated that he questions whether canine medicine comes within the scope of the law the defendant was accused of violating.

Obviously, in view of the many state laws governing the possession of dogs, these rulings are not consistent. It is that inconsistency organized veterinary medicine should attempt to remove.

APPLICATIONS

These columns are a month-by-month record of the success of organized veterinary medicine in recruiting new members to its constantly expanding domain.

First Listing*

- ADAMS, JOSEPH B.
Kerrville, Texas.
D.V.M., Texas Agricultural and Mechanical College, 1939. Vouchers: U. E. Marney and W. A. Lawrence.
- ADAMS, JOSEPH H.
114 W. 11th Ave., Huntington, W. Va.
D.V.M., Ohio State University, 1938. Vouchers: Isaac H. Maxwell and H. M. Newton.
- BEALL, CHARLES CLEDUS
872 University Ave., Morgantown, W. Va.
D.V.M., Terre Haute Veterinary College, 1912. Vouchers: J. H. Rietz and H. H. Fairbank.
- BEAUCHAMP, JOHN WOODROW
1946 N. 32nd St., Kansas City, Kan.
D.V.M., State College of Washington, 1939. Vouchers: E. E. Wegner and J. E. McCoy.
- BUCKLEY, FRANK W.
730 E. Main St., Greensburg, Ind.
D.V.M., Indiana Veterinary College, 1920. Vouchers: J. L. Axby and L. A. Merillat.
- CAMUTI, LOUIS J.
Room 6411, Chrysler Bldg., N. Y., N. Y.
B.S., Cornell University, 1916 D.V.S., New York-American Veterinary College, 1920. Vouchers: Cassius Way and C. P. Zepp.
- CUNKELMAN, JOHN WILLIAM
Box 111, Perry, Mich.
D.V.M., Michigan State College, 1938. B.S., Pennsylvania State College, 1932. Vouchers: Howard E. Johnson and F. W. Chamberlain.
- DUEY, FERNLEY WILLARD
4027 S. 24th St., So. Omaha, Neb.
D.V.M., State College of Washington, 1939. Vouchers: E. E. Wegner and Ernest C. McCulloch.
- FALLON, WALTER J.
414 Grand St., Troy, N. Y.
D.V.M., Cornell University, 1939. Vouchers: F. F. Fehr and L. A. Merillat.
- FISHERMAN, FRANK
23 Federal Bldg., Kansas City, Kan.
D.V.M., Texas Agricultural and Mechanical College, 1939. Vouchers: F. A. Imler and L. A. Merillat.
- FLOOK, BERTRAM C.
24 Wellington St., Barrie, Ont.
D.V.M., McKillip Veterinary College, 1915. Vouchers: W. Moynihan and G. A. Rose.
- GORDON, HENRY
2649 Jerome Ave., Bronx, N. Y., N. Y.
D.V.S., Cornell University, 1918. Vouchers: Robert Berens and Harry C. Stamen.
- GREENO, RALPH W.
Point Pleasant, W. Va.
D.V.M., Ohio State University, 1938. Vouchers: H. M. Newton and E. B. Ingmand.
- GRIFFIN, LUTHER MARTIN
3710 W 6th St., Amarillo, Tex.
D.V.M., Iowa State College, 1938. Vouchers: T. S. Leith and E. B. Ingmand.
- HARDMAN, FRED EVANS
304 Upland St., Chester, Pa.
V.M.D., University of Pennsylvania, 1934. Vouchers: Wm. Lentz and M. W. Allam.
- HAYDEN, CRAWFORD JOSEPH
Box 384, Arvada, Colo.
D.V.M., San Francisco Veterinary College, 1913. Vouchers: Thomas E. Traylor and Jay H. Bouton.
- HOLM, HAKON
Bourbon, Ind.
B.V.Sc., Ontario Veterinary College, 1938. Vouchers: J. L. Axby and L. A. Merillat.

*See January 1939 JOURNAL.

HUNTER, WADE GEORGE

965 S Kentucky Ave., Evansville, Ind.
D.V.M., Indiana Veterinary College, 1916.
Vouchers: John L. Kixmiller and J. V. La-croix.

JACKSON, LEWIS L.

1302 Sycamore, Corsicana, Tex.
D.V.M., Texas Agricultural and Mechanical College, 1939. Vouchers: R. P. Marsteller and E. B. Ingmand.

KINGDON, CAPT. EARL GOSS

Veterinary Station Hospital, Fort Bliss, Tex.
D.V.M., Colorado State College, 1936. Vouch-ers: Col. Daniel B. Leininger and Lt. Col. Joseph H. Dornblaser.

MILLER, CLEMENT LAMBERT

517 W Court, Beatrice, Neb.
D.V.M., Kansas State College, 1934. Vouch-ers: Carl J. Norden and E. B. Ingmand.

OLIVER, JOHN

Box 415, Columbus, Miss.
D.V.M., Alabama Polytechnic Institute, 1920.
Vouchers: W. L. Gates and L. A. Merillat.

REDMOND, HAROLD E.

c/o The Luling Foundation, Luling, Tex.
D.V.M., Texas Agricultural and Mechanical College, 1939. Vouchers: R. P. Marsteller and E. B. Ingmand.

ROBINSON, OTIS J.

Lake Odessa, Mich.
D.V.M., Michigan State College, 1936. Vouch-ers: C. F. Clark and B. J. Killham.

STILES, MAXWELL M.

3070 W. Michigan Ave., Battle Creek, Mich.
D.V.M., Michigan State College, 1935. Vouch-ers: F. E. Stiles and C. R. Blatchford.

TAUSSIG, PAUL EDWIN

Parshall, Colo.
D.V.M., Colorado State College, 1922. Vouch-ers: James Farquharson and I. E. Newsom.

THIMMIG, JOHN W.

Brighton, Colo.
D.V.M., Colorado State College, 1937. Vouch-ers: I. E. Newsom and E. B. Ingmand.

TOWER, WILLIAM JAMES

637 Main St, Leominster, Mass.
B.V.Sc., Ontario Veterinary College, 1939.
Vouchers: L. A. Paquin and W. H. Dodge.

WERNER, JULES J.

552 North Ave., New Rochelle, N. Y.
D.V.M., Cornell University, 1936. Vouchers: Orville E. McKim and Clayton E. De Camp.

YAMASHIRO, YOSHIO

2206 Wilder Ave, Honolulu, Hawaii.
D.V.M., Iowa State College, 1935. Vouchers: H. D. Bergman and H. E. Biester.

ZLOTNICK, ALBERT MORRIS

3726 Riverdale Ave., Bronx, N. Y.
D.V.M., Texas Agricultural and Mechanical College. Vouchers: B. J. Finkelstein and L. A. Merillat.

Second Listing

Abraham, Max C., Box 203, Edon, Ohio.

Ahern, Thomas J., 62 White St., Hartford, Conn.

Anderson, Donald B., Sparta, Tenn.

Au, Robert J., 6245-33 North East, Seattle, Wash.

Bain, Alexander F., Ontario Veterinary College, Guelph, Ont., Canada.

Barth, Orrin E., 2314 N. 24th St., Birmingham, Ala.

Beggs, Stuart William, Lamar, Colo.

Bell, William Thomas, Box 135, Douglasville, Ga.

Bendixen, Hans C., Magnoliavej 53, Copenha-gen, Denmark.

Black, Jean Jaures, Sauk Centre, Minn.

Blumenshime, Emil Lee, Washington, Ill.

Bowers, Grafton D., 326 Post Office Bldg., Baton Rouge, La.

Boyd, Homer C., Pine Bluff, Ark.

Boyd, Walter Alan, Box 66, Hackettstown, N. J.

Carle, Birdsall N., 1135-3rd St., Porterville, Calif.

Cassidy, Donald L., 507 Federal Bldg., Little Rock, Ark.

Clark, G. R., 222 Bird St., Hannibal, Mo.

Coates, Fred B., Dobson, N. Car.

Curry, Oral B., Morristown, Ind.

Curtis, R. E., Ransom, Ill.

Danforth, Arno, 701 W. Franklin St., Winches-ter, Ind.

Davenport, Roy Franklin, 3810 Spruce St., Philadelphia, Pa.

Davis, Frank C., Kenneth, Mo.

Decker, H. L., College Corner, Ohio.

Dempsey, Obe Gardner, 107 Cherry St., Green-ville, Ky.

Demsey, H. W., 238 E. Washington St., Hunt-ington, Ind.

- Eatman, Ovid R., Gadsden, Ala.
 Eddins, Samuel Graves, Box 225, Woodstock, Va.
 Ewing, Robert Arthur, 228 W. Main St., Canfield, Ohio.
 Ferree, Earl, Danville, Ind.
 Fittipaldi, Silvio Anthony, 121 White Horse Pike, Collingswood, N. J.
 Fletcher, M. M., 2001 S. Lincoln St., Springfield, Ill.
 Fowble, John Carroll, Timonium, Md.
 Galloway, Henry Paul, Cortez, Colo.
 Gieske, Albert George, 312 Grove St., Barrington, Ill.
 Goodman, L. J., Norton, Kan.
 Gredinger, Eric, Georgetown, S. C.
 Haigler, Gilbert N., 7645 Delmar Blvd., St. Louis, Mo.
 Hambrick, G. Walter, Princeton, W. Va.
 Hander, Raymond T., Belton, Texas.
 Hanson, Elmo Walter, 2201 Texas St., El Paso, Texas.
 Hill, James E., 207 S. Green St., Longview, Texas.
 Hinson, L. J., McGehee, Ark.
 Hornsby, Will Sydney, Lafayette, La.
 Kepner, R. E., New Castle, Ind.
 Ketchersid, James R., College Station, Texas.
 Koostra, Andrew, 226-11th St., Bowling Green, Ky.
 Kord, Clemens Edward, 1209 Gale Ave., Nashville, Tenn.
 Kroger, Herman J., 4944a Sutherland Ave., St. Louis, Mo.
 Lombard, Roland Arnold, 2285 Commonwealth Ave., Auburndale, Mass.
 Love, William Graham, 7120 Lincoln Drive, Philadelphia, Pa.
 McClure, John Fremont, 5200 Rhode Island Ave., Hyattsville, Md.
 McCracken, William Allen, 1621 Queen St. W., Toronto, Ont., Canada.
 McKinney, E. Belton, Box 355, Dyersburg, Tenn.
 Miller, Edwin L., Ripley, W. Va.
 Miller, L. A., Menasha, Wis.
 Mommsen, Peter Henry, 588 E. Davant St., Memphis, Tenn.
 Monroe, Floyd E., 1094 McCallie Ave., Chattanooga, Tenn.
 Moore, Joe H., 751 Meeting St., Charleston, S. Car.
 Mullenney, Patrick H., 1 Vista St., Boston, Mass.
 Nolan, Alfred Francis, University of Kentucky, Lexington, Ky.
 Norman, Chauncey Theodore, 2965 N. E. Sandy Blvd., Portland, Ore.
 Ottiker, Russell L., 908 S. Central, Marshfield, Wis.
 Osteen, Wilson Marshall, Ahoskie, N. Car.
 Parker, R. H., Wilkinson Blvd., Charlotte, N. Car.
 Parsons, Elton V., Emporia, Kan.
 Peters, I., Fordyce, Ark.
 Poulin, Howard Carter, 40 Webster St., Nashua, N. H.
 Price, Charles Dudley, Box 1721, Charlestown, W. Va.
 Rich, George C., Box 855, Austin, Texas.
 Rile, E. Barclay, Skippack Pike, Blue Bell, Pa.
 Romigh, Fred E., Elmdale, Kan.
 Rosner, Leonard A., 5025a Mardel, St. Louis, Mo.
 Sadow, Irving J., Cleveland, Tenn.
 Schott, Francis Joseph, Box 398, Palestine, Texas.
 Seevers, Fred L., Pleasant Hill, Mo.
 Sherman, Harry Louis, Box 191, Willimantic, Conn.
 Shipman, Clarence E., Tiffin, Ohio.
 Siress, James, Cleveland, Tenn.
 Smith, Hugh Dowd, 1547 W. Clinch Ave., Knoxville, Tenn.
 Speers, C. H., Stanberry, Mo.
 Stallworth, C. G., Drew, Miss.
 Stanley, Paul R., Acton, Ind.
 Stapleton, Sydney Franklin, 605 Harrold Ave., Americus, Ga.
 Stefanski, Anthony M., Wiggins, Miss.
 Steinbach, Karl Friedrich, Tierartzlichen Schule, Universitat von Zurich, Switzerland.
 Steinmetz, William Edward, 3432 Sheffield Ave., Oakland, Calif.
 Stephens, George Wrenshal, Blacksville, W. Va.
 Stern, Aaron L., 68 Charles St., Meriden, Conn.
 Stults, Amos Waters, 9 East Broad St., Hopewell, N. J.
 Taylor, Theodore Fred, 133 W. Court St., Warsaw, N. Y.
 Tillman, O. W., 1619 Main St., Trenton, Mo.
 Tinder, J. E., Brook, Ind.
 Todorovic, Valerian, Glenwood Springs, Colo.
 Venable, Joseph W., 955 Forest Ave., Gadsden, Ala.
 Venzke, Carl E., 227 Sheldon, Ames, Iowa.
 Walcher, Charles Edwin, Witt, Ill.
 Walker, William Kenneth, Box 21, Jerome, Idaho.
 Weisberg, Victor, Europa, Miss.
 Welles, E. H., Dyersburg, Tenn.
 Wells, John Lyle, 1817 Holmes St., Kansas City, Mo.
 West, John L., 446 N. Gay, Auburn, Ala.
 Whitaker, Ross Landess, Fayetteville, Tenn.
 William, Newcomb L., College Corner, Ohio.
 Williamson, E. C., Montpelier, Ind.
 Wirt, F. G., 806 Jackson Ave., Thibodeau, La.
 Yager, Geo. F., Sauk Centre, Minn.
 Zuercher, Vilas W., Route 1, Medina, Ohio.
 Ziskind, Morris L., 1190 Paterson Plank Road, Secaucus, N. J.

The amount that should accompany an application filed this month is \$5.83. This covers membership fee and dues to January 1, 1940, including subscription to the JOURNAL.

Charter of the A.V.M.A.*

Certificate Number 91

STATE OF ILLINOIS

Office of

THE SECRETARY OF STATE

(Seal)

To all to whom these presents shall come, greeting:

Whereas, a certificate duly signed and acknowledged has been filed in the office of the Secretary of State on the 17th day of March, A. D., 1917, for the organization of the AMERICAN VETERINARY MEDICAL ASSOCIATION and in accordance with the provisions of "An Act Concerning Corporations," approved April 18, 1872, and in force July 1, 1872, and all acts amendatory thereof, a copy of which certificate is hereto attached;

Now, therefore, I, Louis Emmerson, Secretary of State of the State of Illinois by virtue of the powers and duties vested in me by law do hereby certify that said

AMERICAN VETERINARY MEDICAL ASSOCIATION is a legally organized corporation under the laws of this state.

In testimony whereof, I set my hand and seal of the State of Illinois.

Done in the City of Springfield, this 17th day of March, A.D., 1917, and in the independence of the United States, the 141st.

LOUIS L. EMMERSON,
Secretary of State.

Application for Charter

STATE OF ILLINOIS }
COOK COUNTY } ss

We, the undersigned, Charles E. Cotton, Veranus A. Moore, L. A. Merillat, George B. McKillip and John F. Ryan, propose to form a corporation under the act of the General Assembly of the State of Illinois, entitled "An Act Concerning Corporations," approved April 18, 1872, and all acts amendatory thereof and for that purpose of such organization we hereby state as follows:

1) The name of such corporation is

AMERICAN VETERINARY MEDICAL ASSOCIATION

2) The object for which said corporation is formed is to protect and promote professional interests of the veterinarian; to procure the enactment and enforcement of uniform laws and regulations relative to veterinary practice

*At the Memphis meeting, it was voted that the constitution and by-laws and code of ethics of the Association were to be revised for publication in the November JOURNAL and presented to the House of Representatives for approval at the 1940 convention in Washington, D. C. Due, however, to the fact that over one third of this issue is given over to committee reports, it seemed advisable to withhold publication of the complete document until the December number and to publish only the revised constitution and a reprint of the charter in this number.

and the control of animal diseases; to disseminate knowledge and to direct public opinion regarding the problems of animal hygiene; to promote good fellowship in the profession. And, for the accomplishment of the aforesaid objects it shall have power to enact a constitution and by-laws consistent with the laws of the State of Illinois and of the United States and with the purpose aforesaid; to prescribe the qualifications of the members of aforesaid association and to receive and collect membership dues; to publish a journal devoted to the purposes of said association and to the promotion of the science of veterinary medicine and surgery, which journal shall be called the "Journal of the American Veterinary Medical Association"; to own, control and dispose of property in all articles, papers, or literary matters whether copyrighted in accordance with the laws of the United States or otherwise, devoted to the subject of veterinary medicine and surgery which shall be presented to or read at any meeting of aforesaid association or published in the journal of said association; to own and dispose of any real or personal property and equipment used in or about said offices of said association or in or about the plant for the publication of the aforesaid journal; to enter into any and all legitimate contracts concerning the purposes of said association or the publication of their journal and to do any and all such other acts as may be consistent with the constitution and the laws of the State of Illinois and of the United States and are reasonably directed to the accomplishment of the purposes of said association.

3) The management of the aforesaid American Veterinary Medical Association shall be vested in a board of six trustees who shall be elected in such manner and for such periods as the constitution and by-laws of said association shall provide.

4) The following persons are selected as the trustees to control and manage said corporation for the first year of its corporate existence: namely, Veranus A. Moore, F. Torrance, W. Horace Hoskins, John R. Mohler, C. H. Stange and R. A. Archibald.

5) The location is in the City of Chicago, in the County of Cook, in the State of Illinois and the post office address of its business office is No. 1827 S. Wabash Avenue, in the said City of Chicago.

Signed:

CHARLES E. COTTON,
V. A. MOORE,
L. A. MERILLAT,
GEO. B. MCKILLIP,
JOHN F. RYAN.

The signature of the signers was notarized as follows:

STATE OF ILLINOIS }
COUNTY OF COOK } ss

I, L. Roy Lewis, a Notary Public in and for the county and state aforesaid, do hereby certify that on the 25th day of February, A.D.,

1917, personally appeared before me L. A. Merrillat, Geo. B. McKillip, C. E. Cotton and John F. Ryan, to me personally known to be the same persons who executed the aforesaid certificate and severally acknowledged that they had executed the same for the purposes therein set forth.

IN WITNESS WHEREOF, I hereunto set my hand and seal the day and year above written.

L. ROY LEWIS,
Notary Public.

As Dr. Moore was not present to sign the document, it was sent to his address—the New York State Veterinary College, Ithaca, New York—to be legally notarized, as follows:

STATE OF NEW YORK }
COUNTY OF TIMKINS } SS

I, Helena N. Naight, a Notary Public in and for the county and state aforesaid, do hereby certify that on this 27th day of February, A.D., 1917, personally appeared before me

VERANUS A. MOORE

to me personally known to be the same person who executed the foregoing certificate and acknowledged that he had executed the same for the purpose therein set forth.

IN WITNESS WHEREOF, I have hereunto set my hand and seal, the day and year above written.

HELENA N. NAIGHT,
Notary Public.

Constitution

Article I

Section 1.—This association shall be incorporated under the name of American Veterinary Medical Association.

Section 2.—It shall be incorporated by the state in which its principal office is located.

Section 3.—Its corporate officers hereinafter described shall comply with the laws of the United States governing corporations and of the laws of the state in which the Association is incorporated.

Section 4.—It shall forever remain a non-profit organization in fact.

Objectives

Article II

The objectives of the Association shall be:

1) To promote the science and art of veterinary medicine and its related branches;

2) to improve, encourage and support the development of the veterinary service of this civilization;

3) to elevate the standards of veterinary education leading to the degree of Doctor of Veterinary Medicine;

4) to protect the professional and personal interests of duly qualified veterinarians;

5) to procure the enactment of just and appropriate laws and regulations governing the practice of veterinary medicine;

6) to direct public attention to the relationship of animal production and animal health to human welfare;

7) to coöperate with public health services in controlling diseases of domestic animals detrimental to mankind;

8) to publish such literature as may be deemed necessary to accomplish these objectives;

9) to acquire and hold such real and personal property as may be required to carry out the Association's corporate undertakings.

Membership

Article III

The membership of this association shall consist of the following classes:

a) *Corporate Membership.*—The regularly chosen constitutional officers, the members of the Executive Board and House of Representatives, as described and established in the constitution and administrative by-laws, shall constitute the membership of the Association in its corporate capacity.

b) *General Membership.*—The general membership, otherwise known as the active members, shall consist of graduates of veterinary colleges approved by the Association who have been duly elected in the manner hereinafter provided.

c) *Honorary Membership.*—The honorary membership shall consist of veterinarians or other persons in any part of the world who have risen to prominence in the veterinary profession or who have contributed distinguished service to veterinary science or to the advancement of its application. The election and privileges of such members shall be described in the administrative by-laws.

d) *Junior Membership.*—The junior membership shall consist of members in good standing of the junior chapters chartered by the Association and maintained in accordance with the administrative by-laws.

e) *Associated Membership.*—Scientists whose work is closely related to animal production or public health may be elected associate members on terms and in numbers provided in the administrative by-laws.

Constituent Associations

Article IV

Section 1.—State, territorial and provincial veterinary associations which have or may hereafter become organized in conformity with the general plan of the American Veterinary Medical Association shall be recognized upon application as constituent or affiliated organizations, provided such application is approved by a majority vote of the Executive Board.

Section 2.—The term "state association" shall be understood to mean the principal veterinary organization of any state of the Union whose membership is restricted to graduates of recognized veterinary colleges. The term "ter-

ritorial association" shall apply to such organizations of any of the territorial possessions of the United States, including the District of Columbia. The term "provincial association" applies in the same manner to the provinces of the Dominion of Canada.

Section 3.—The term "principal veterinary organization" shall be understood to mean the society having in its membership the largest number of members of the American Veterinary Medical Association.

Executive Board

Article V

Section 1.—There shall be a business body known as the Executive Board of the American Veterinary Medical Association which shall have complete charge of the property and the financial affairs of the Association, including the management of all of its publications.

Section 2.—The Executive Board shall be the administrative body of the Association and it shall make reports of its actions to the House of Representatives at each annual meeting.

Section 3.—The number of members of the Executive Board, their term of office, the method of choosing them, and the filling of vacancies shall be provided in the administrative by-laws.

Section 4.—The Executive Board shall be charged with the appointment of an executive secretary, assistant secretary and/or editor of publications. The tenure, the condition of employment, and the salaries of these employes shall be described in the administrative by-laws.

Section 5.—Three members of the Executive Board shall constitute the Board of Governors, who shall have charge of the administrative affairs of the Association between the regular meetings of the whole Board. It shall be composed of the president, the president-elect and the chairman of the Executive Board and shall hold meetings at such times and places as the chairman may direct. It shall make an annual report of its actions to the whole Board which shall be included in the records of the actions of the Executive Board.

House of Representatives

Article VI

Section 1.—There shall be a legislative body known as the House of Representatives of the American Veterinary Medical Association, which shall be composed of delegates of state, provincial and/or territorial associations officially designated as component societies of the Association, together with delegates of such other groups of veterinarians which the Executive Board with the approval of the House of Representatives shall deem entitled to representation. The number, tenure, voting power, filling of vacancies, authority, and method of election of the members of the House of Representatives shall be described in the administrative by-laws.

Section 2.—The House of Representatives shall conduct all business of the Association except that otherwise provided for by the constitution and administrative by-laws.

Section 3.—The House of Representatives is, in principle, the voice of the active members. It shall approve or disapprove all matters presented to it by the Executive Board. Its vote, carried out in accordance with customary parliamentary procedure, shall be final. Matters originating in the House, or presented to it by authorized committees, or by any of the regular sections of the Association, shall be submitted to the Executive Board for consideration, and returned to the House for final action.

Officers

Article VII

Section 1.—The officers charged with duties affecting the entire Association shall consist of a president; a president-elect; five vice-presidents, designated for seniority as 1st, 2nd, 3rd, 4th, and 5th; an executive secretary; a treasurer; and a chairman of the Executive Board.

Section 2.—These officers shall be known as the corporate officials of the Association and charged with the duty of complying with the laws of the United States governing corporations and of the commonwealth in which the Association is legally chartered to transact business.

Section 3.—Each of these officers shall be chosen at an annual meeting and shall serve for a term of one year, or until his successor has been elected and installed.

Section 4.—The eligibility, tenure, duties and method of election shall be described in the administrative by-laws.

Sessions

Article VIII

Section 1.—The words "session" and "meeting," or authorized division thereof, shall be defined as the membership convened in accordance with the provisions set forth in the administrative by-laws.

Section 2.—The time, kind, place, number, duration, and purpose of constitutional sessions shall be described in detail in the administrative by-laws.

Amendments

Article IX

Section 1.—The constitution can be amended only by majority vote of both the Executive Board and the House of Representatives, taken at a regular session of the Association one fiscal year after the amendment is first presented. The term "fiscal year" in this section means the time between two consecutive annual sessions.

Section 2.—Proposed amendments shall be written and read before the Executive Board and House of Representatives during a regular annual session.

Section 3.—Amendments favorably acted upon shall be published in the official journal at least 60 days before the annual meeting at which final action is to be taken.

Section 4.—Amendments finally adopted under the provisions set forth in this article shall be published within 60 days following their adoption and shall become a part of the printed constitution and administrative by-laws thereafter issued.

Section 5.—The publication of amendments as provided in section 3 shall not be abolished.

CLINICAL DATA

Mummification of the Bovine Fetus Associated with Bang's Disease*

By C. R. DONHAM, D.V.M., M.S., and B. H. EDGINGTON, D.V.M.

Columbus, Ohio

MUMMIFICATION of the bovine fetus apparently is associated with a variety of abnormal conditions within the pregnant uterus. Williams¹ is of the opinion that mummification of the fetus begins with an interplacental hemorrhage. Boyd² also lays stress on this factor in the statement, "Intra-uterine death of the fetus, with subsequent desiccation, may result from placental hemorrhage which, if extensive, causes a separation of the fetal and maternal placenta." He also suggests that this material (=interplacental blood clot) is thought to be usually sterile. With regard to mummification as related to Bang's disease infection in the pregnant uterus, Boyd states:

The relation of bacteria to mummification of the fetus is problematical. It may be that *Bacterium abortus* is occasionally responsible for fetal desiccation. . . We have recently had, under our observation, two animals in which the fetus had become mummified. The blood of these cows was tested by the agglutination method used in the diagnosis of bovine infectious abortion. Both gave positive reactions. The desiccated fetuses were not cultured.

Bang³ succeeded in isolating *Brucella* organisms from the uterine contents of two cows affected with mummification of the fetus. De Bruin⁴ states that mummification occurs only when air is absolutely excluded or when expulsion is prevented. He suggests that torsion of the uterus is the condition that most frequently interferes with expulsion of the fetus. Boyd² cites a case due to torsion of the uterus in which the mummy had been carried for 29 months

before the animal was destroyed and suggests that it would no doubt have been carried many more months if the cow had been permitted to live. De Bruin⁴ quotes Frank as follows: "Many mummified calves have distinct parallel grooves on their surface from the folds of the twisted uterus."

CASE REPORT

A mummified fetus was observed in a grade Jersey heifer bred for the first time



Fig. 1. Mummified fetus expelled by grade Jersey heifer 69 days after normal due date (283 days) for parturition.

at approximately 21 months of age. A diagnosis of pregnancy in the right horn of the uterus was made by rectal palpation 84 days after breeding. This heifer at 168 days of gestation was experimentally infected with virulent *Brucella* organisms administered on the grain feed. Fourteen days later the agglutinin titre had changed from negative to positive and remained at a high positive level as long as the animal was maintained on the experiment.

Rectal palpation at 227 days of gestation revealed a pregnancy which was thought to be normal. The operator did not know the duration of pregnancy at the time of examination, and the pregnancy was estimated as of 5½-month duration, whereas it was approximately 7½ months. This indicates that the process of desiccation of

*From the Ohio Agricultural Experiment Station and The Ohio State University, animal disease research laboratories, Reynoldsburg, Ohio.

the fetus had probably set in before the date of this examination and, presumably, was responsible for the gross underestimation of the age of the fetus. Approximately one month after the date at which this heifer was due to calve, a definite diagnosis of mummified fetus was made by rectal palpation but no attempt was made to bring about expulsion of the fetus. The fetal fluids had disappeared to an extent that the uterus was contracted around the fetus, which could be palpated readily.

The heifer expelled a mummified fetus 69 days after the normal due date (283 days) for parturition (fig. 1). The fetus weighed 16 pounds and measured 29 inches from the tip of the nose to the buttock. The lower portions of the limbs and the head were covered with fine hairs. The skin showed a wrinkly, leather-like, dry condition. The abdominal cavity did not contain any fluid. The stomach and intestine were practically empty. There was no evidence of decomposition. The age of the fetus at the time of arrest of its development was estimated at 6½ to 7 months, based upon its general appearance and size.

A genital examination conducted less than 24 hours following expulsion of the fetus failed to reveal anything resembling clotted blood that might have resulted from an interplacental hemorrhage, and no such blood clot had been found in the stall. There was no external swelling or edema of the vulva and no noticeable relaxation of the sacro-iliac ligaments. The mucosa of the vulva and vagina was bruised and swollen and tender on palpation. A small quantity of blood-tinged mucus was found in the vagina. The cervix was partly closed and would admit only two fingers, thus preventing exploration of the uterine cavity. Based on rectal palpation, the uterus was comparable to one after five to seven days of involution following a normal parturition. The mammary tissue showed no enlargement or swelling such as follows normal parturition and which is usually apparent following an abortion, particularly in the later stages of pregnancy. The mammary secretion was extremely scanty and was more watery than normal colostrum.

Guinea pigs were injected with colostrum, saline suspensions of vaginal exudate and fetal spleen, liver, and stomach mucosa. *Brucella abortus* organisms were obtained only from guinea pigs that had been injected with the mammary secretions.

There were seven other pregnant heifers in this group of experimental animals. All were exposed to *Brucella* organisms on the same day, in the same manner and with the same cultures. Each of these heifers developed positive agglutination titres and aborted their fetuses, from which *Br. abortus* organisms were obtained.

It seems logical to assume that the uterus in which this mummified fetus was carried was infected with viable *Brucella* organisms at some time during the pregnancy and that the uterus had sterilized itself during the protracted period of gestation. This view is supported by the fact that the udder of this heifer was infected and there were specific agglutinins in her blood. It is further strengthened by the fact that all of seven other pregnant heifers similarly exposed, aborted and *Brucella* organisms were obtained from the aborted fetuses. If this assumption is correct, what factors caused the *Brucella* organisms to disappear from this uterus? It is generally accepted that *Brucella* organisms usually disappear rapidly from the nongravid uterus. In this case, did the properties of the uterus following desiccation of the fetus simulate the nongravid uterus and thus provide an unsuitable environment for the organisms?

It is well established that mummified fetuses in cows are usually carried indefinitely unless some treatment is instituted to bring about their expulsion. In this instance, the fetus was expelled by the heifer without outside interference after a gestation period of 352 days. Here is a case of mummified fetus in the absence of torsion of the uterus and, as far as could be determined, in the absence of interplacental hemorrhage.

References

- ¹Williams, W. L.: Diseases of the Genital Organs of Animals, p. 470.
- ²Boyd, W. L.: Mummification of the bovine fetus. Jour. A.V.M.A., lxx (1924), n. s. 18 (6), pp. 737-742.

Chagas' Disease (= American Trypanosomiasis)

CHAGAS' DISEASE is a South American protozoan infection affecting man and animals. Chickens, cattle, hogs and dogs are mentioned among domestic animals susceptible. Mice, guinea pigs and monkeys responded to experimental inoculations made recently by workers of the U. S. Public Health Service in various cities of Texas (Austin, Dal-

carried out in Texas in 1937-1938, and reported (*loc. cit.*) that "persons who have crushed the bug on their skin or rubbed its excretions into their eyes should be looked upon as possible cases of Chagas' disease." (Though a blood-sucking bug, its bites are not infective.)

On account of increasing international communication, the world is getting small for the spreading of indigenous infections. Only a watchful and ever-increasing disease-control service (human and veterinary) can insure a nation against the ravages of these "diseases of the future." Whether *T. cruzi* (isolated extensively in the United States with its proved virulence for laboratory animals) possesses grave potentiality may be much less important than the fact that infections, by penetrating far beyond their original locale, are constantly imposing new problems upon the services charged with maintaining health in man and animals.

The horse is the largest of existing hoof-footed animals (= ungulata) and the moose deer (= chevrotain) is the smallest. The moose deer weighs about six pounds and its height is less than twelve inches from withers to ground.

Although the microbicidal action of x-rays has been well known and amply demonstrated for years, the study of their action upon hyperplastic tissue (tumors) has turned the therapist's mind away from their use in microbic diseases.



—After Cesar Pinto, 1938.

Fig. 1. Dog infected with *Leishmania chagasi*.

las, Galveston, San Antonio), where they demonstrated the widespread presence of the specific protozoan in the bodies of vectors common in the southwestern part of the United States.

The disease was named for Dr. Carlos Chagas, Brazilian scientist who, in 1907, isolated the causal organism now known to microbiologists as *Trypanosoma cruzi*. The vector is the reduviid bug, *Triatoma gestakeri*, commonly known in this country as the Mexican bedbug and kissing bug. Of the 46 listed species of the insect, 15 are known to exist in Texas, Arizona and California, but the causal parasite (*T. cruzi*) was believed not to exist north of Panama until Kofoid and Whitaker (1936) and, later, Packchianian (*Public Health Reports*, August, 1939) demonstrated its presence in this country through extensive field studies



—After Cesar Pinto, 1938.

Fig. 2. Chagas' disease in the adult, chronic form.

(Continued from preceding page)

¹Bang, B.: The etiology of epizootic abortion. *Jour. Comp. Path. & Therap.*, x, 11, p. 135.

²De Bruin, M. G.: Bovine Obstetrics, p. 125.

Brucella Abortus and Its Agglutinin in the Colostrum and Milk of Cows Vaccinated with U.S.B.A.I. Brucella Strain 19*

By L. H. SCRIVNER,† D.V.M.

Laramie, Wyo.

A STUDY was made of the colostrum and milk of a group of first-calf heifers during the first lactation periods. Twenty-eight had been vaccinated during calthood (4 to 6 months) with U.S.B.A.I. Brucella strain 19, living culture vaccine. A high degree of Bang's disease infection was maintained in the group throughout the gestation periods in order that all animals would be exposed. Individual quarter colostrum samples and a blood sample were collected at the time of parturition and individual quarter milk samples and a blood sample were collected at the first of each succeeding month from each cow then in lactation. Colostrum samples were cultured and injected into guinea pigs to determine the presence of *Brucella abortus*, after which they were separated with rennet and tested for the presence of agglutinin by standard tube and plate methods. Milk samples were cultured and, after rennet separation, were tested for the presence of agglutinin. Blood samples were tested by the tube method.

At the time of parturition five cows in the vaccination group were eliminating *Br. abortus* in the colostrum, and 18 showed significant agglutinin (1:100 or higher) in the colostrum. Two of the five had subdiagnostic blood titres. Blood tests at this time showed six reactors, eight suspects, and 14 negative animals. In the unvaccinated group nine were eliminating *Br. abortus* in the colostrum and 15 showed significant agglutinin in the colostrum. Blood tests showed 13 reactors, one suspect and seven negative animals.

In subsequent retests only one vaccinated cow was found to be eliminating *Br. abortus* in the milk, eleven days after parturition, and with the exception of one cow,

significant agglutinin could not be found in the milk of any vaccinated animal. This one exception eliminated agglutinin in the milk for 3½ months, when the work was terminated. In the unvaccinated group, of the 15 showing colostrum agglutinin four became negative and eleven continued to show significant milk agglutinin as long as testing was continued. *Br. abortus* was isolated from the milk of four cows at the first retest, from three cows on the second retest and from one cow on each of the third and fourth retests.

All cultures of *Br. abortus* isolated from colostrum and milk required carbon dioxide atmosphere for isolation, and all produced lesions in guinea pigs. Hence, it is believed that strain 19 was not isolated from any cow.

It is believed that the vaccination prevented permanent infection of the udder to the extent that *Br. abortus* could not be recovered after eleven days postpartum and in only one of 28 cows could Brucella agglutinin be demonstrated in the milk of vaccinated cows, three to 26 days following parturition.

Cesareotomy and Ovariectomy in a Heifer

The author was confronted with a heifer presenting three feet of dangling afterbirth and futile straining to deliver her calf. Her physical condition was grave—cold extremities, dry muzzle, shallow breathing (35 p.m.), pulse full and rapid (110 p.m.), rectal temperature 104° F., rumination stopped, and frequent defecation.

An exploration of the vagina revealed a congenital constriction 9 inches from the vulva, through which but two fingers could be passed. The opening was located along the right wall of the vagina and, beyond

*Abstract of part of a thesis presented to the faculty of the graduate school of Cornell University in partial fulfillment of the requirements for the degree of Master of Science.

†University of Wyoming Agricultural Experiment Station.

it, the calf's muzzle could be felt with the intruding fingers.

Cesareotomy having been agreed upon, the heifer was removed to the hospital, where the operation was performed. The heifer was cast, chloroformed and operated upon in the usual manner, with the difference that, after suturing the uterine incision, the ovaries were removed to prevent future conceptions and repetition of the dystocia.

Post-operative revival and recovery were prompt. The patient was on her feet in two hours and was discharged from the hospital on the seventh day. (*Hugh Curtis, B.V.Sc., M.R.C.V.S. The Veterinary Journal, xcv, July, 1939, pp. 282-286.*)

Oversized Fetus

THE HOLSTEIN-FRIESIAN is prone to develop a fetus too massive for easy delivery. Such a fetus, not only too large but also malpresented and surrounded with hairballs, is

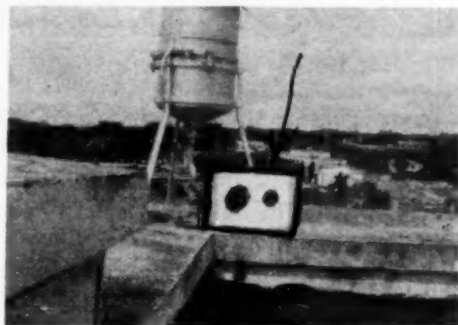


The force of 15 men was required to extract the oversized fetus from this cow.

reported by the well known G. A. Roberts, chief veterinarian of the Dominican Republic.

The owner had expected delivery three months earlier. Examination revealed the cervix open but not widely dilated. After evacuating the fetal liquid, the fore legs, folded backward, could be felt. As traction caused the head to turn to the side, it was hooked between the jaws and straightened out. The pull of three men, then six men, then 15 men was required to effect delivery. The case, troublesome as it was, would not be regarded as the subject of an essay but for the presence of 27 large hairballs found

floating in the afterbirth. "In 40 years of obstetrical work this is the first time I



Hairballs found floating in the afterbirth (average size, 6 inches in diameter).

have encountered this abnormality of gestation," Roberts said. The larger of these balls measured 8 inches in diameter.

Bovine Type of Tubercle Bacillus Not Less Virulent for Man Than Human Type

In an article, entitled "Does Bovine Type of Tubercle Bacillus Produce an Independent Disease Entity in Human Subjects?", C. J. Huët (abst., *Jour. A.M.A.*, Sept. 9, 1939) points out that the path of infection rather than the virulence of the organism is responsible for the pathogenic difference between the tuberculous infection contracted from bovine and human sources. The route of the infection for the bovine type is the digestive tract, whence the invasion leads to involvement of other organs which have a chance to overcome the infection. It is not proved that the bovine bacillus has a tendency to produce metastatic forms of the disease. Its path through the digestive tract leads to the lymph nodes and the bones, hence these types of the infection in children. The human type, on the contrary, strikes directly the most vulnerable of organs—the lungs.

The nutritive ratio of soybean meal is 1:1.1 and its digestible nutrients are 89.5 per cent.

Food Intoxications in Sheep*

By L. B. SHOLL, B.S., D.V.M., M.S.

East Lansing, Mich.

INTOXICATIONS at times cause considerable loss in Michigan, especially in feeder lambs. Sheep appear to be quite sensitive to sudden changes or to abnormal conditions in feeds. It is very difficult in many cases to determine definitely what the cause of disturbance is. It has been the experience of some feeders that deaths occur associated with very long, continued, heavy feeding. It appears that corn silage and corn fodder may sometimes cause much mortality and bean pods have apparently caused losses in some cases. These losses are probably due either to spoilage or to improper balance in the ration. Too heavy feeding of shelled corn has been incriminated in some cases. Many losses are sometimes incurred when feeders are run in corn fields, due probably to spoilage, gorging or irregular eating. In cases where a diagnosis of intoxication is made, it is necessary to study the feeding combination in order to determine the possible cause.

The following is an example of the difficulty sometimes experienced in solving such problems. Two farmers bought a double-deck carload of feeder lambs and divided them as equally as possible. They figured the ration together and were using self-feeders. One lot of lambs did well, while many were dying in the other lot. Autopsy of one lamb led to a diagnosis of intoxication. Professor Brown of the animal husbandry department was consulted. Only one difference could be found in the two lots of lambs. The farmer having no losses was feeding shelled corn raised on his farm, while the one losing lambs had purchased his corn. No abnormalities could be found on examination of the feed, but a suggestion was made that he borrow enough corn from his neighbor to feed for about ten days. He reported that he had

lost no more lambs after making the change.

Each case of intoxication should be considered as an individual problem and changes in feed tried, eliminating feeds which arouse suspicion. There is also an apparent difference in results in successive years with the same feeding methods. There may be no losses one year and considerable mortality the next. The reason for this has not been determined.

SYMPTOMS

Many of the animals brought in for autopsy are found dead, no previous sickness having been noticed by the owner. Manifestations of nervous disturbance are common. There is staggering and tossing of the head. The animal may appear to be blind, often running into racks or other objects. There may be rotation of the eyeballs. Loud grating of the teeth is common. The affected animal becomes weak and goes down. Many of the animals brought to the laboratory for examination are down, show a state of partial coma, and continuously work their legs, as if running. Some appear paralyzed in the hind legs. The affected animals may die very quickly or live for a day or more. Some may recover with a change of feed.

AUTOPSY FINDINGS

The brain shows marked congestion. The lungs show congestion and edema, which may be very marked in some cases. This is apparently terminal in nature, for it is not seen when sick animals are killed. The heart may show subepicardial and subendocardial hemorrhages. The liver usually shows some congestion and, in certain cases, is very fatty and friable. In the rumen the food material is usually rather sour and acid. It is often firmly packed and forms a mass which is hard to break up. The abomasum and intestine may show variable

*From the animal pathology section, Michigan Agricultural Experiment Station. Published with the permission of the director of the Station as journal article No. 394, n. s.

amounts of congestion and usually contain very little food material. The kidneys are usually congested and undergo softening soon after death.

DIAGNOSIS

Symptoms are quite similar to those found in pregnancy disease but should not be confused with that disease, as intoxication affects nonpregnant animals and lambs.

A large number of blood examinations were performed. Hemoglobin values were not significant. Values for 42 animals ranged from 5.4 to 18.9 Gm. per cent (35 to 131 per cent). Seven animals showed definite anemia. The average for all samples was 13 Gm. per cent (91 per cent).

Forty-two red blood-cell counts ranged from 3,920,000 to 17,600,000 per cmm. Several animals were markedly anemic, while some had extremely high values, possibly due to dehydration. The average for 42 animals was 10,201,570 per cmm.

Forty-two white blood-cell counts fell within a wide range, from 3,350 per cmm. to 25,900 per cmm. Only two were definitely subnormal; 17 were above normal. The general average was 11,370 per cmm.

Forty-two blood-glucose determinations ranged from 24.63 mg. per cent to 266.66 mg. per cent. Ten animals had subnormal values; 24 had marked hyperglycemia. This is in contrast to pregnancy disease, in which low values are predominant. The average for all determinations was 109.42 mg. per cent.

Forty-two non-protein-nitrogen determinations ranged from 27.02 to 171.40 mg. per cent, averaging 48.16 mg. per cent. Seventeen cases showed definitely high values.

Forty-two creatinine determinations ranged from 0.91 to 4.61 mg. per cent, averaging 1.64 mg. per cent. Only five cases showed abnormally high values.

Eighteen urea determinations ranged from 8.1 to 61.5 mg. per cent, averaging 24.3 mg. per cent. Only four cases showed abnormally high values.

Forty-one chloride determinations, expressed as NaCl, ranged from 220 to 580

mg. per cent, averaging 473 mg. per cent. Only two were abnormally low and only five were abnormally high.

Various diagnoses have been made in cases of intoxication. At times, farmers believe that animals thus affected have hemorrhagic septicemia, and in some cases the diagnosis has been made by a veterinarian.

The history, symptoms and autopsy findings are thought by the author to be typical enough to make a diagnosis of intoxication.

TREATMENT

Various methods have been used by the writer without favorable results. A few mild cases have recovered spontaneously upon a change of feed. It is believed that the trouble lies in the rumen, and little success has been experienced in attempts to alter the conditions present. Until an effective treatment is developed, the only method of control is elimination of the cause.

Purpura Hemorrhagica in a Dog

By C. EDWARD TAYLOR, B.S., D.V.M.

Merced, Calif.

THE SUBJECT, a 10-week-old Collie, had been sick for about ten days before being presented for treatment. The owner stated that the pup refused food, had a fetid diarrhea, and would stand with the head dejected and the tail down.

Upon examination, the temperature was found to be normal. The visible mucous membranes were anemic and the abdomen was slightly distended, due to the accumulation of fluids. Palpation revealed that the liver was greatly distended and the intestine thickened and corrugated.

Hemorrhagic areas, varying in size from a pinhead to a dime, the larger of which were raised, extended over the skin. Although particularly noticeable on the inner surface of the thighs and on the abdomen, these areas were also clearly seen wherever the hair was parted. There even were spots on the inner surface of the ears.

The prognosis was unfavorable and, no

attempt was made to treat the patient. Five hours later the temperature had risen to 107° F. and, a few minutes following, the dog died.

Postmortem examination revealed large hemorrhagic areas in the lungs. The heart, kidneys, liver and spleen were dotted with petechial hemorrhages, and the liver had swollen one third of its normal size. The stomach and small intestine were anemic. Extensive hemorrhagic areas were observed in the large intestine, particularly in the portion toward the terminal end of the colon. There was an accumulation of bloody fluid in the abdominal cavity. The bladder appeared normal.

Purpura hemorrhagica of the dog is not a common disease. Virtually no satisfactory information pertaining to it can be found in recent textbooks or journal reports.

Thallium Sulfate Poisoning in a Dog

By J. LEBISH, D.V.S.

Bronx, N. Y.

ALTHOUGH thallium sulfate poisoning in dogs is rare, it sometimes occurs in the spring of the year, when insecticides containing the drug are placed within the reach of pet animals. The thallium sulfate in these preparations is mixed with a jelly or sweetened powder and, therefore, is palatable to dogs.

The subject was a Scotch Terrier, male, 4 years of age, which had ingested ant poison that the owner had placed in his garden. It was estimated that the poison consumed by the dog contained 1 gr. of thallium sulfate. Before being brought to the writer, the dog had vomited persistently, trembled, and seemed to be in pain. When the animal was presented (May 7, 1939), the following symptoms were observed: Patchy loss of hair, resembling alopecia; salivation; marked congestion of the conjunctiva and mucous membranes of the lips; temperature, 102.5° F.; pulse, 165;

and, on palpation, extreme sensitiveness of the abdomen.

The above symptoms persisted for two days. On May 10, the temperature became subnormal; the hind quarters showed pronounced weakness; the membranes of the lips and nose had become ulcerated; vision was impaired; the hair had fallen from half of the body; the animal was in a confused state; and the bladder was incontinent. Colicky pains lasted throughout this period and there was marked dehydration resulting from emesis. The patient died while in a comatose condition on May 11.

TREATMENT

When the animal was brought to the hospital, apomorphine was injected to produce emesis, followed by a stomach wash and colonic irrigation with calcium sulfide, 2.6 Gm. (= 4 gr.) to 480 cc. (= 1 pt.) of water. Five cc. of a 25 per cent solution of sodium thiosulfate was given intravenously every four to five hours, and a 2-gr. dose of sodium iodide was administered internally every four hours. In addition to these antidotes, 100 cc. (= 3 1/3 oz.) of a solution of saline and 10 per cent of dextrose was given subcutaneously every eight hours to offset the dehydration resulting from vomiting. This treatment was continued for 36 hours, after which supportive treatment was given.

POSTMORTEM FINDINGS

Postmortem examination revealed the following: Severe stomatitis and gastroenteritis; swollen, reddened and blackened areas of all mucous membranes; fatty degeneration of the liver; and petechial hemorrhages in the heart, kidneys and lungs.

COMMENT

If treatment as outlined is not instituted immediately, the affected animal invariably dies. Through administering treatment within one hour following poisoning, a Fox Terrier which had eaten an ant paste containing thallium sulfate was saved.

Pulmonary Aspergillosis in a Skunk*

By A. J. DURANT, B.S.A., A.M., D.V.M., and ELVIS R. DOLL, B.S.A.

Columbia, Mo.

SINCE Mayer and Emmet (1815) recorded the presence of the *Aspergillus* in the lungs of a jay, this fungus has been reported frequently from all of the avian families in Europe and the United States. Domestic fowls and wild birds in captivity may be affected by aspergillosis, caused usually by *Aspergillus fumigatus* Fres. This fungus disease also has been reported in practically all domesticated animals, including the dog. It is usually characterized by the development of a fungus in the respiratory organs.¹ Man is quite susceptible to the disease, numerous cases having been reported.



Fig. 1. Foster mother with the five baby skunks and one kitten. The skunks were about 11 days old when this photograph was taken. Thirty-five days later, one of the skunks developed aspergillosis. (Photo courtesy of W. O. Nagel, wildlife department, University of Missouri.)

On May 20, 1939, five orphan skunks, about 10 days old, were brought to the wildlife department of the University of Missouri. The mother of these skunks had been killed by a stray dog and a mother cat was persuaded to serve as their foster mother. (See figure 1.) These skunks grew quite rapidly, and it was decided that it would be unsafe to keep them longer without removing the scent glands. Consequently, on June 14, 1939, they were

brought to the veterinary department, where the operations were performed.

These animals were then returned to where they had been kept—a basement with a concrete floor. When examined one week after the operation, they appeared to be in good health. All of the wounds had healed with the exception of one. This was healing rather slowly but no pus or infection seemed to be present.



Fig. 2. Lungs and trachea of the affected skunk, showing marginal areas of greenish discoloration with hemorrhage produced by the *Aspergillus fumigatus*. Lesions are particularly noticeable in the lower left diaphragmatic lobe and the upper right apical lobe of the lungs.

On June 24, 1939, ten days after the operation, one of the skunks was found dead and was brought to the veterinary department for examination. This animal proved to be the one that had the slow-healing wound. Examination showed no secondary inflammatory processes and the

*From the department of veterinary science, University of Missouri.

wound was well walled off. A dirty-gray diarrhea was present. An autopsy revealed that all internal organs were normal except the lungs. A marked greenish discoloration with hemorrhage in the marginal areas of all of the lobes was present (fig. 2). The alveoli of the diseased areas were filled with a greenish, watery fluid, with some blood exuding when the surface was cut. The primary, secondary, and small bronchi showed a catarrhal inflammation and a mucous exudate of greenish color from the presence of the mould on the mucosa. The mycelia of the mould could be readily demonstrated with cover-slip preparations of the lung tissue. This mould was identified as *Aspergillus fumigatus*.

At the time of the death of the skunk, an examination was made of the room where the animals were being kept. The floor was damp and a mouldy grain was found on the floor which apparently was the source of the infection.

The other skunks were immediately removed from the room and placed in an open-air run. No further cases of aspergillosis developed.

To the authors' knowledge, this is the first case of aspergillosis to be reported in the skunk, and for those who contemplate raising these animals in confinement, this instance should be a warning to guard against outbreaks of the disease.

Reference

- ¹Durant, A. J., and Tucker, C. M.: Aspergillosis of wild turkeys reared in captivity. Jour. A. V. M. A., lxxxvi (1935), n.s. 39 (6), pp. 781-784.

Anaerobic Bacteria in Colics

In an article on anaerobic bacteria in the horse, the author points out how these habitual and ordinarily innocent inhabitants of the digestive tract play an important rôle in the pathogenesis of grave organic disorders associated with the phenomena of colic. A group of well known organisms of this class are normal hosts of the digestive tract which, under ordinary conditions, do not pass into the circulation. However, when there are intestinal or hepatic lesions of any type, a grave bacter-

emia ensues. If the invasion of the circulation is slight, nothing particularly noticeable happens but, if intense, accurate hemolytic icterus, hepatonephritis or anemia develops.

The colic in the acute form, although dull and altered by periods of calm, becomes gradually worse. Chills, profuse sweating, tumultuous heart action, icteric conjunctiva, rise in temperature, pawing, and getting up and lying down at frequent intervals make up the complex characterizing this enterotoxemia.

As death approaches, the symptoms are dramatic. Frenzy, dropping suddenly to the ground, trismus and sitting dog fashion are among the signs of approaching death. Grave anaerobic invasions of the circulation from the digestive tract may lead to edema of the limbs, neck and nose that may show gaseous crepitation in the center. The complete evolution lasts 18 to 24 hours; less acute cases, 48 to 60 hours; and the more latent forms, six to ten days.

Hemoculture is negative but search of the liver and spleen in subjects hastily autopsied after death reveals the presence of anaerobes in anaerobic media.

The practitioner should remember that such infections exist independent of the mechanical causes of colic. In the presence of certain symptoms he should suspect the "gangrenous" origin of the trouble and resort to the proper treatment. Latent cases may be confounded with infectious anemia and piroplasmiasis. (Paul Rossi and L. M. Saunier. *Les microbes anaerobies dans le pathologie interne du cheval. Bulletin de l'Académie Vétérinaire de France*, xii, June, 1939, pp. 226-232.)

The rarest quadruped in the world is the giant panda of the mountains of Tibet and western China. The few specimens in captivity are the principal attractions at the zoological parks fortunate enough to possess them.

Like many other things, the Chinese thought of it first. The recent gold fish swallowing fad was anticipated thousands of years ago by Chinese epicures who swallowed live baby crabs.—*American Weekly*.

CURRENT LITERATURE

ABSTRACTS

Specific Distemper Vaginitis

FEMALE PUPS, preceding the age of puberty, suffer from a vaginitis caused by the virus of distemper (Carré's virus). The disease affects pups of 2½ to 4 months of age. It is manifested by the appearance of a thick, greenish discharge showing at the inferior commissure of the vulva. In some cases studied, the lips of the vulva were edematous and sensitive; in others, this symptom was absent. The local symptoms were accompanied with depression, inappetence, diarrhea, and a rise of temperature.

The absence of microorganisms in the discharge at the onset led the author to suspect Carré's virus as the causative agent. This was further confirmed by the response of the patients to injections of homologous serum but the exact nature of the infection was proved later by experimental inoculations of susceptible pups. The test animals were pups raised in the laboratory and unexposed to natural infection.

Pus collected from the vagina was injected subcutaneously into two subjects. On the third day following the inoculation, both presented a rise of temperature. One, however, resisted the infection. The other manifested all of the classical symptoms of canine distemper, including the appearance of the usual complication on the 15th day. On the 17th day, when the pup's temperature reached 41.2° C. (= 106° F.), 9 cc. of blood was taken from the saphenic vein and injected subcutaneously into a ferret. Typical symptoms of distemper appeared in ten days, and four days after the symptoms appeared, the ferret died. The author's conclusions are that a specific vaginitis due to Carré's virus exists in pups before puberty, that the general symptoms of this form of the disease are benign, that the attack responds to homologous antiserum, and that the vaginal discharge continues for several

weeks after recession of the general malaise. (*Berthelon and Goret. Vaginite spécifique de la Chienne impubère déterminée par le virus de Carré. Bulletin de l'Académie Vétérinaire de France, xii, June, 1939, pp. 222-225.*)

Epidemiology of Weil's Disease

WEIL'S DISEASE, whose specific pathogen is the icterohemorrhagic spirochete, has been proved without question not to be transmissible by direct contact between persons. Man is infected indirectly from a virulent source represented by rats, which throughout the whole world are carriers of the specific organism to the degree of 40 to 50 per cent. Rats infected secrete infective urine without presenting the disease in apparent form.

The main carriers are old rats, especially the species *Mus decumanus*, but, in addition, dogs can, under exceptional circumstances, be reservoirs of the spirochete. Stuttgart disease is an example of the dog as a carrier. Schüffner isolated a canine specimen of the organism that does not exist in the rat, but the canine type was less pathogenic for man and guinea pigs than the rat type. Japanese workers have found that the rat (*Microtus montebelli*) is a carrier also.

From the practical point of view, only the rat may be considered as the carrier. Man becomes infected directly or indirectly from that rodent. During the World War soldiers living in humid trenches in close contact with rats easily caught Weil's disease. The spirochete excreted by the urine inoculated them through abrasions of the hands or by the mouth with contaminated food. The same observations have been made among laborers in ports of Hamburg and London who worked in the silos. In

Japan workers in the rice fields are commonly victims. Bathing in or falling into ponds or canals is a source of infection. Rat bites may infect. The spirochetes have been isolated in the mouth and upon the body of rats but their morphological similarity remains to be clarified.

The rarity of the disease in man is believed to be due to erroneous diagnoses of infectious icterus. The organisms can not resist desiccation, putrefaction or solar light and they are killed by acid urine.

The author draws attention to the destructive effect of optimum acidity on the spirochete ($\text{pH } 7.8$). Sea water kills them. Rat to rat infections occur through the intermediary of bites, food and water. Although man to man transmission, in view of these facts, is rare, subjects who have resisted the infection may be unknown carriers, since the disease may exist in the anicteric form. These cases account for the presence of the disease in countries where it is not thought to exist. In these instances it may be confused with typhoid fever, influenza, acute nephritis, meningitis, *et al.* Great pain in the limbs is quite pathognomonic.

Seroreactions may be obtained from the blood of convalescents for about a year and, thus, a retrospective diagnosis can be made.

Convalescent serum and rabbit serum have given favorable results but have the disadvantage of losing their curative properties in a short time. There is no successful chemotherapy save bismuth salts that is known to prevent the propagation of the spirochete in laboratory animals. (Uhlenhuth. *Epidemiologie, diagnostic, traitement et prophylaxie de la maladie de Weil. Revue de Pathologie Comparée et d'Hygiène Générale*, xxxvii, Feb. 1937, pp. 147-150).

Pregnancy Disease of Ewes

With the coming of each lambing season, losses in the breeding flock varying from 10 to 50 per cent may occur through a visitation of the metabolic disorder commonly called pregnancy disease. Ewes carrying twins or triplets are more sus-

ceptible than unigravida and the incidence is highest in underfed and underexercised flocks. However, well fed flocks closely housed during the terminal months of gestation are not exempt.

Depleted hepatic and muscle glycogen due to the nutritive requirement of the ewe is an etiological factor. The disorder is related to the metabolism of fats. Glycogen is replaced by fat cells with a consequential increment of ketone bodies, which normally are converted into CO_2 and water for elimination. The end result is pronounced acidosis.

The presence of the disease is announced by inappetence, weakness, staggering, trembling, frequent micturation and, finally, walking in a circle, pressing the head against the wall, semicoma, coma, paralysis and death. Lambs born of affected ewes seldom survive. The disease is differentiated from digestive toxicosis by the ketone test.

There is no satisfactory treatment. Prevention consists of outdoor exercise and wholesome, balanced rations. Corn, oats and a leguminous hay supplemented with molasses or other sugar represents the type of preventive ration. (L. D. Frederick, *Iowa Veterinarian*, x, Sept.-Oct. 1939, pp. 5-9.)

BOOK NOTICES

Laws About Dogs

A handy booklet of unusual interest to dog owners, entitled "Laws About Dogs," published by the Judy Publishing Company, tell the facts everyone should know about the legal status of the canine species in the social arena. In law the dog is not just another domestic animal; he is allowed privileges denied to man's other animal possessions. To know the extent and bournes of these concessions is knowledge worth having in this day of lawsuits. The small animal practitioner, who is constantly interrogated as to the limitations of canine conduct, will find the content particularly helpful. The booklet covers

briefly the history of canine laws, titles of ownership, justifiable killing, restraint, quarantine, liability of dog owners, the owners' protection, laws on cruelty *et al.* (*Laws About Dogs, third edition, by Capt. Will Judy. 14 pages. 1939. Price, 25 cents.*)

Udall's Third Edition

The third edition of *Practice of Veterinary Medicine* within the short period of six years is the harbinger of a new era of popularity for good literature among American veterinarians. Not since the German translations arrived at the turn of the century has any veterinary book imposed the task of two revisions in such rapid succession.

The old habit of buying good books as fast as they appeared had completely died out in the veterinary profession. It was quenched by teachers' notes in the colleges and by bulletins and house organs in the field of practice. The desire to build up a fine library was a stalemate. So, when a reviewer of 1939 comes upon third editions he is conscious of the fact that readers of good veterinary literature have multiplied—that the practitioners, in reappraising the value of bound library literature, are again espousing knowledge in lieu of mere skill as a means to their end.

Practice of Veterinary Medicine is a manual on the diseases of farm animals compiled from the actual clinical work of the author and his associates of the Cornell ambulatory clinic. A close study of the descriptions of those diseases with which one is intimately familiar shows clearly that the text is based upon bedside observation, not upon the fantastic plausibility that the best of veterinary medical authors have been prompted to use to fill white space. Perhaps the waning popularity of our text books was, after all, due to this fault of the authors, which Udall skilfully removes by relating, first, the up-to-date scientific facts and, then, connecting them with the clinical tableau.

Practically all of the common diseases of farm animals encountered in the more thickly settled parts of the United States

are included. The illustrations are relevant and the diction is the familiar style of this well known American author. We do not, however, subscribe to the use of italics for emphasis, nor to their omission (here and there) in naming bacteria and metazoan parasites.

The veterinarian who does not possess this book is losing an opportunity to keep abreast with the hour on utilitarian knowledge. (*The Practice of Veterinary Medicine, third revised edition, by D. H. Udall, B.S., D.V.M., D.Sc., professor of veterinary medicine and superintendent of the ambulatory clinic in the New York State Veterinary College at Cornell University. 672 pages, with 102 illustrations. Published by the author at Ithaca, N. Y., 1939. Price, \$6.00.*)

In the article by H. W. Schoening, entitled "Equine Encephalomyelitis," which appeared in the September 1939 issue, pages 268-272, it was stated, "Last year the chick-embryo vaccine was prepared by one commercial firm only."

"While the great majority of the vaccine used in 1938 was prepared by one commercial firm," Dr. Schoening stated in a recent communication, "two other firms had also prepared vaccine for distribution and use to a limited extent."

There exists a definite correlation between the consumption of raw milk and unpasteurized dairy products and the incidence of cases of undulant fever.—*Medical Times.*

The principal causes of death among the American population, named on a descending scale, are heart disease, cancer, nephritis, cerebral hemorrhage, tuberculosis, infant diseases, motor accidents, influenza, and diabetes.

Food, Feed, Forage.—A food is an edible substance for the nourishment of the human race. A feed is an edible substance fed to animals. Forage is feed for herbivorous animals.—*From Subsistence Bulletin No. 13, Q.M.C., U. S. Army.*

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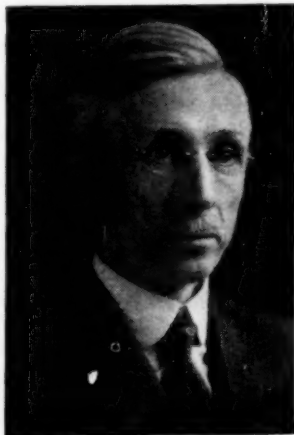
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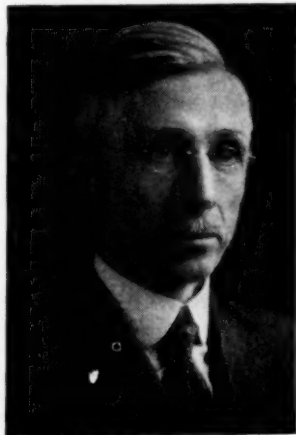
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U. S. GOVERNMENT

Civil Service Examination for Position of Junior Veterinarian Announced

The U. S. Civil Service Commission has announced an open competitive examination for the position of junior veterinarian in the federal bureau of animal industry, at a salary of \$2,000 per year. Vacancies in this position in the field and in positions requiring similar qualifications will be filled from this examination.

The duties of the position include antemortem and postmortem inspection of food animals and inspection of food products; administration of tests for disease; control and eradication of disease; sanitary inspection of establishments; and related assignments.

Applications must be filed with the Commission at Washington, D. C., not later than November 9, 1939, if received from states west of the Rocky Mts., and not later than November 6, 1939, if received from states east of the Rockies. Applicants must not have passed their 45th birthday on the closing date for receipt of the application.

The forms necessary for application may be obtained from the Secretary, Board of United States Civil Service Examiners; at any first-class post office; from the Commission in Washington, D. C.; or from any U. S. Civil Service district office.

The exact title of the examination—Junior Veterinarian, \$2,000 a year, Bureau of Animal Industry, Department of Agriculture—should be stated on the application form.

Federal Experiments on Artificial Breeding Promote Improved Technic

Recent breeding experiments conducted by the bureau of animal industry show that the most economical and quickest way to improve live stock is to spread the influence of good sires.

Genetic studies led to record-of-performance tests whereby sires can be selected which pass on to their progeny an improved inheritance of such qualities as milk and butterfat production for dairy animals. Bureau scientists expect to develop suitable record-of-performance standards for measuring the ability of sires for beef cattle, swine, sheep and work animals. Their years of work, particularly with dairy cattle, show that exceptional sires are difficult to find. Once found, there is the problem of spreading their influence as widely as possible.

Within the past five years bureau workers

have concentrated on artificial insemination as a method of extending the influence of good sires from ten to 20 times beyond that possible by natural mating. Livestock breeders of Denmark and Russia have been using this method successfully for several years.

In several instances the bureau has shipped semen from rams at the Animal Disease Station in Beltsville, Md., by plane to Dubois and Moscow, Idaho, where ewes were successfully inseminated. Ewes at the Station also have been inseminated with semen from Idaho rams.

For practical application of this new method, it is recommended that it be used only in areas that have a dense livestock population.

U.S.D.A. Club Organized; W. A. McDonald Elected President

At a meeting held at the Louisiana State University on October 16, a U. S. Department of Agriculture club was organized and W. A. McDonald (K. C. V. C. '12), inspector in charge of federal bureau of animal industry field activities in Louisiana, was elected president. Representatives of the various branches of the U. S. agricultural department attended the meeting. Plans were made to hold a session once each month and to invite all department employees to affiliate.

At these meetings it is planned to have representatives of the department discuss their activities in order that all employees may become familiar with the activities of the different divisions. It is believed that these contacts will enable the various branches of the department to coordinate their activities and thereby render a more valuable service to the public.

D. D. CONNER, Reporter.

Regular Army

By direction of the president, and under the provisions of Public No. 18, 76th Congress, 1st Lieut. David Samuel Hasson, veterinary corps reserve, is ordered to active duty, effective September 18, 1939, and directed to proceed without delay from Chicago, Ill., to Scott Field, Ill., for duty.

Captain Harvie R. Ellis is relieved from assignment and duty at Fort George Wright, Wash., and from additional duty at Spokane, Wash., effective on or about November 1, 1939, and assigned to duty at Fort Bliss, Texas.

Lt. Colonel Solon B. Renshaw is relieved from duty at Fort Huachuca, Ariz., effective on or about November 1, 1939, and assigned to duty at Fort George Wright, Wash.

Announcement is made of the promotion of the following-named lieutenant colonels to the grade of colonel with rank from date opposite their names: Jacob E. Behney, Sept. 3; Raymond A. Kelser, Sept. 7; Jesse D. Derrick, Sept. 7; Clell B. Perkins, Sept. 10; Horace S. Eakins, Sept. 10; Isaac O. Gladish, Sept. 10; Jean R. Underwood, Sept. 10; Clifford C. Whitney, Sept. 10, and Harold E. Egan, Sept. 10.

Veterinary Corps Reserve

NEW ACCEPTANCES—FIRST LIEUTENANTS

Albert M. Michaels, 450 Beach 69th Ave., New York, N. Y.; Isidor I. Sprecher, East Haddam, Conn.

PROMOTIONS—TO CAPTAIN

Max H. Carlin, 18 Dolphon Ave., Winthrop, Mass.; Mark Sternfels, 89 Thayer St., New York, N. Y.; Montgomery A. Tegg, 3 University Ave., Rochester, N. Y.

TRANSFERRED TO INACTIVE SERVICE

Major Edward H. Lenheim, 10403 Thrust Ave., Cleveland, Ohio.

B.A.I. Transfers

Francis B. Anderson from Chicago, Ill., to Kansas City, Kan., on virus-serum control; Lee M. Becton from Baltimore, Md., to Raleigh, N. Car., on Bang's disease; James H. Coleman from Boston, Mass., to Lyndonville, Vt., in charge of meat inspection; Henry Donelson from Fort Worth, Texas, to Atlanta, Ga., on Bang's disease; Wm. G. Duncan from Indianapolis, Ind., to Evansville, Ind., on meat inspection; Glen O. Fly from Evansville, Ind., to Indianapolis, Ind., on meat inspection; Sydney Folsie from Lyndonville, Vt., to Hartford, Conn., in charge of meat inspection; Robert D. Green from Frankfort, Ky., to Omaha, Neb., on meat inspection; Julius S. Katz from Harrisburg, Pa., to S. St. Paul, Minn., on meat inspection; Ross E. Meader, Jr., from Chicago, Ill., to Des Moines, Iowa, on meat inspection; Joshua F. Meyer from Des Moines, Iowa, to St. Joseph, Mo., on virus-serum control; Glen F. Patton from New York, N. Y., to Kansas City, Kan., on meat inspection; J. Howard Slack from Lincoln, Neb., to Helena, Mont., on tuberculosis eradication; James Kral from Augusta, Me., to Oklahoma City, Okla., on Bang's disease; Edward C. Phipps from Charleston, W. Va., to Frankfort, Ky., on Bang's disease; Harold Propp from Oklahoma City, Okla., to Boise, Idaho, on Bang's disease; Todd P. Rothrock from Charleston, W. Va., to Harrisburg, Pa., on Bang's disease; Robert O. Rothermel from Pottsville, Pa., to Philadelphia, Pa., on meat inspection; Fred M. Shigley from Little Rock, Ark., to Oklahoma

City, Okla., on tuberculosis eradication; John W. Smith from Denver, Colo., to Bismarck, N. Dak., on Bang's disease; Walter A. Sullivan from Cheyenne, Wyo., to Indianapolis, Ind., in charge of tuberculosis eradication; Clifford W. Wilder from New York City to Richmond, Va., on Bang's disease; Wallace L. R. Williamson from Austin, Minn., to South St. Paul, Minn., on meat inspection.

AMONG THE STATES

British Columbia

The Columbia Veterinary Association has applied for affiliation with the A.V.M.A. and has named its delegate to the House of Representatives. It thus becomes the first Canadian association to seize the opportunity of making the Association a more solid international society. W. Graham Gillam, M.R.C.V.S., of Vancouver is the secretary, an office he has held for many years.

Connecticut

The New England Veterinary Medical Association's tenth annual convention was held at the Hotel Bond in Hartford, October 2-3. Approximately 200 veterinarians and their wives were registered.

Both evenings of the meeting were devoted to the reading of technical papers and the clinics occupied the afternoons. The address of welcome was given by Mayor Spellacy. R. H. Smith, state veterinarian of New Hampshire and mayor of Laconia, N. H., delivered the response. Cassius Way, president of the A.V. M.A., of New York City was guest speaker at the banquet and dance held on the first evening.

Following are the officers elected for the ensuing year: Kimball Kennedy of Waterbury, Vt., president, and H. W. Jakeman of Boston, Mass., secretary-treasurer (re-elected).

The New England livestock sanitary officials held their annual meeting in connection with the convention. George E. Corwin of Hartford, deputy commissioner on domestic animals for Connecticut, was re-elected president, and Harry W. Pirce of the division of livestock control of Massachusetts was re-elected secretary.

GEORGE E. CORWIN,
Resident Sec'y.

Illinois

The University of Illinois veterinary conference, held at Urbana, October 5-6, drew an attendance of 169. Planned and directed by Robert Graham, chief of the division of animal pathology and hygiene, the program comprised a succession of well chosen titles and speakers that was interspersed with attractive demonstrations.

"Ketene saves lives," Charles D. Hurd of Northwestern University, Evanston, Ill., told 1,000 members of the Chicago section of the American Chemical Society on September 23. He said that experiments are being carried on today in which ketene is employed to treat serums that are used for injections to fight diseases, including pneumonia and diphtheria. Explaining the value of ketene, he said in part:

The protection afforded by ketene in the serums can best be illustrated by considering the case of an ordinary bee sting. One sting is never fatal, but a second one has been known to result in death. Death is caused by the shock, not emotionally but chemically, to the human system.

Death can also be caused by the injection of two identical serums. Treatment of the serums by ketene makes the system immune to the shock and may prove invaluable in fighting diseases. Thus far, the experiments have proved successful in animals.

Ketene is composed of carbon, hydrogen and oxygen and is produced by heating acetone. There are about 15 kinds of ketene but only a few have been adapted to commercial or medical uses.

The chemical is used also in making cheap acetate silk—the kind commonly found in coat sleeves.

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Illinois health officers and public health nurses will hold their annual conference in Springfield on December 7-8, 1939. Of particular interest to veterinarians will be the special session for milk sanitarians on Thursday afternoon, December 7. Those wishing further information relative to this session should communicate with Dr. A. C. Baxter, Director, Illinois Department of Public Health, Springfield, Ill.

Indiana

Forty-seven veterinarians of the Tenth District (Ind.) Veterinary Medical Association held an all-day meeting in Centerville on September 28. The activities centered about the clinics—horse and mule, small animal, and cattle—headed, respectively, by R. E. Kepner of New Castle, H. Meade Hamilton of Muncie, and J. J. Arnold of New Castle. Supplies were donated by The Corn States Serum Company, Grain Belt Supply Company, Fort Dodge Laboratories, Inc., Jensen-Salsbery Laboratories, Inc., and the Pitman-Moore Co.

C. F. Clark of Michigan State College, East Lansing, Mich., discussed sterility in cows, illustrating his talks at the morning and afternoon sessions with specimens from the College museum.

Iowa

Drs. Giffie and Barger of the federal bureau of animal industry warn farmers through the

Cedar Rapids Gazette (Sept. 25) that swine influenza should not be overlooked at this time of the year and that inasmuch as cholera often clouds the pathological tableau, vaccination against the disease is a necessary measure of protection. Swine owners are also warned that cholera "seems to be prevalent in districts heretofore fairly free from the infection."

Kansas

The livestock sanitary commissioner of the state has issued a regulation whereby all stock pigs passing through community sales must be inspected, and vaccinated either with serum and virus or with serum alone, effective October 15, 1939.

There are about 100 community sales in Kansas; hence, the ruling has attracted widespread interest among veterinarians of the state. The inspection fees have been set by the commissioner at 2 cents per head for sheep and swine and 1 cent per head for cattle and horses, plus 10 cents per head for vaccinating pigs and 5 cents for tagging them.

Serum and virus are to be furnished at the advertised price to the laity. This plan was devised by the livestock commissioner and a group of Kansas practitioners, and is intended to operate for the welfare of the livestock owners. Community sales without proper veterinary inspection have been a menace in the state for several years.

Kentucky

Fort Riley (Kan.) army officers recently visited the department of animal pathology of the Kentucky Agricultural Experiment Station, University of Kentucky, Lexington.

The purpose of their visit was to learn about the work in progress at the animal pathology department on equine diseases. They were especially interested in periodic ophthalmia, wobblers, parasites and respiratory diseases.

Maryland

J. W. Crowl was elected president of the board of county commissioners of Queen Anne County, Md., in the fall of 1938. W. J. Sullivan was recently elected to membership on the board of county commissioners in Washington county and A. J. Gross was reelected registrar of wills in Harford county. From this it appears that Maryland veterinarians have won the confidence and respect of their fellow citizens.

New Jersey

A meeting of the Trent Veterinary Society was held at the club house of the Rockefeller Institute for Medical Research, Princeton, on October 5.

E. W. Smillie of the Institute, who is a member of the state board of health, outlined the status of rabies control in New Jersey and described the functions of various agencies concerned with suppressing the disease. J. G. Hardenbergh of Plainsboro discussed immunity against brucellosis, with references to the possible channels of entrance of *Brucella* infection under natural conditions and the amount of infective material that might be disease producing under natural conditions as compared with infection introduced experimentally. John McGrann of Trenton cited several interesting cases, including the occurrence and surgical treatment of cryptorchidism in cats.

J. R. PORTEUS,
Resident Sec'y.

New Mexico

The annual meeting of the New Mexico Veterinary Association was held at Clovis, October 26-27, 1939. Ashe Lockhart of Kansas City, Mo., and Fred G. Harbaugh of Lubbock, Texas, were visiting contributors to the program.

New York

The 25th semiannual meeting of the Western New York association was held on July 27 at McPherson Point on Conesus Lake. A basket lunch was served by the ladies in the pavilion at the Point. Later in the afternoon, the group enjoyed a boat ride around the lake. Following, the ladies were entertained by Mrs. E. G. Thompson at her cottage near the Point.

President Frank McBride of Tonawanda called the business session to order at 4:30 p. m. At the close of this procedure W. M. Thomson of the state laboratory at Salamanca spoke briefly on some orders issued recently by the state department relative to the free testing of blood samples taken from approved herds.

A banquet was held at Culver Manor, with 90 members, their wives and friends in attendance. After the banquet Robert B. McClelland of Buffalo gave a very interesting talk and demonstration on tumors in the dog, which he illustrated with lantern slides. W. A. Dennis of Jamestown showed some of the pictures he gathered on his trip to Europe and the 13th International Veterinary Congress in Switzerland last summer.

F. F. FEHR, *Secretary.*

North Carolina

The state veterinarian's office has employed several veterinarians to do swine-sanitation work and hog-cholera control in the eastern part of the state, where swine growing is a large-scale industry. Some of the men employed have been stationed where there is ample veterinary service, others where such service is

remote. Hog cholera still remains the principal disease of swine in North Carolina.

Ontario

The annual report of the Ontario Veterinary College for the fiscal year ended March 31, 1939, to the provincial minister of agriculture shows an enrollment of 261 students, an increase of 18 over the previous year. The enrollment greatly exceeds the capacity of the college, the report states.

The laboratory of the college examined 26,487 blood samples for Bang's disease, 2,131 pathological specimens of poultry, and made 1,112 bacteriological examinations of various kinds during the year.

The report contains excellent discussions on Bang's disease, bovine mastitis, equine encephalomyelitis, joint ills of foals, bovine hemoglobinuria, stiff lamb disease, a virus disease of canaries, diseases of swine, food poisoning and septic arthritis of young foxes, and a variety of attractive clinical data, which may be regarded as a cross section of the veterinary problems of that province.

Quebec

Noteworthy among the veterinary affairs of Quebec is the publication of the *Canadian Journal of Comparative Medicine*, a monthly now in its third volume that has already won a high place among contemporary veterinary periodicals. Its editorial board comprises prominent figures of Quebec and Ontario. The subscription price is \$2.00 a year. The leading editorial of the September issue, entitled "Canada at War," is a call to arms of the veterinary service of the Dominion. The pandemics of 1918, due in no small degree to undernourishment of vast populations, are cited to remind veterinarians of their obligations.

South Carolina

Plans are near completion for staging one of the best meetings in the history of the Southern Veterinary Medical Association. All sessions will be held in the Jefferson Hotel at Columbia, November 9-11. A. E. Wight, president-elect of the A.V.M.A., is listed among the guests who have been invited to attend. Many of the outstanding practitioners of the country will participate in the clinic, which, according to reports, will be one of the largest ever held in the South.

Tennessee

A. C. Topmiller, state veterinarian, reports that there were 63 outbreaks of hog cholera in 17 counties of the state during the month of September, 1939. Wayne county, with 25 outbreaks, was the most seriously affected. There

were 11 outbreaks of erysipelas in 7 counties; 3 of hemorrhagic septicemia and 2 of blackleg.

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Inasmuch as outbreaks of botulism are few in the southern states, detecting the presence of *Clostridium botulinum* in home-canned vegetables in Tennessee is of interest, says *Public Health Reports* (Aug. 25, 1939). Beans and okra were the canned vegetables found to be contaminated. Type B of the organisms, common in Europe but rare in the United States, was isolated for the first time in that state. On the other hand, *Cl. botulinum* type A toxin, brought in with canned ripe olives, appears to be responsible for the 13 cases which occurred from 1928-1938.

Texas

At their first regular meeting since June, the Houston Veterinary Association convened on October 5 at Frank Hecker's office.

A report from Treasurer Hufnall showed that the Association's finances are in excellent condition. It was stated that the Houston group has again been engaged to serve the Houston kennel club at their next show. The fee of \$40 that is paid for the Association's participation in the two-day show will be deposited in the treasury. A. H. Kutchbach will serve as chief veterinarian at the event.

A motion was passed to send a note of congratulation to John W. Patton of East Lansing, Mich., on his discovery of the cure and cause of fright disease.

J. W. Jenkins was appointed chairman of a committee to cooperate with the state veterinary association and state board of examiners in prosecuting those practicing illegally in the territory.

On Friday evening, October 13, the members and their wives visited the San Jacinto battleground and dined and danced at the San Jacinto Inn, nationally known for its sea food.

J. G. HORNING,

Corresponding Secretary.

Virginia

The Virginia State association held its 46th annual meeting at Norfolk, July 12-14, with headquarters at the Monticello Hotel. An outstanding literary program was presented before a large audience. The Women's Auxiliary enjoyed an exceptionally well planned program throughout the three-day affair.

The following men contributed to the literary portion of the meeting: T. P. Rowe of Richmond; O. F. Foley of Bridgewater; H. W. Jake-man, chairman of the Executive Board of the A.V.M.A., Boston, Mass.; H. G. Parker, director of public health, Norfolk; L. T. Giltner of the U. S. bureau of animal industry, Washington, D. C.; J. W. Scales, assistant pathologist, Vir-

ginia Polytechnic Institute, Blacksburg; D. M. Warren of New York, N. Y.; and I. M. Cashell of Washington, D. C.

A banquet was held on the evening of the 13th in the main dining room of the Monticello. I. D. Wilson of Virginia Polytechnic Institute acted as toastmaster.

The following men were elected to office for the ensuing year: R. Todd Gregory of Fredericksburg, president; H. L. Lyon of Hillsville, 1st vice-president; P. J. Landis of Norfolk, 2nd vice-president; T. P. Rowe of Richmond, treasurer; and A. J. Sips of Richmond, secretary (reelected).

A. J. SIROS, *Secretary.*

Wisconsin

The Southeastern Wisconsin Veterinary Medical Association held a clinic at the hospital of E. L. Morgenroth in Kewaskum, Wis., on September 16. Approximately 60 veterinarians attended the session.

On October 4, the group held a dinner and literary meeting at the Park Hotel in Madison, the Madison veterinarians entertaining. E. E. Heizer of the animal husbandry division of the University of Wisconsin spoke on artificial insemination; V. S. Larson, director of livestock sanitation, discussed the future of livestock disease problems; and James S. Healy gave a talk on the new Bang-testing technic. Sixty-five veterinarians were present, and a lively discussion was held relative to the attitude of the state legislature on appropriations for Bang's disease work. J. E. McDermid, W. Wisnicky, Chas. A. Deadman and James S. Healy participated in the discussion.

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The state legislature has passed a bill appropriating \$250,000 for each year of the biennium for Bang's disease control; Governor Heil has signed the bill.

The Bang's area test was recently inaugurated in Polk county, with a cattle population of 62,469, and work was started a few days ago in Trempealeau county, with a cattle population of 61,628.

West Virginia

The West Virginia Veterinary Medical Association held its annual meeting in the Kanawha Hotel, Charleston, on October 9-10. Thirty-eight veterinarians from West Virginia and Ohio were in attendance.

Out-of-state speakers were E. B. Ingmand of Chicago, Ill., assistant executive secretary of the national association; and C. R. Donham, professor of veterinary medicine at Ohio State University, Columbus, Ohio.

Officers were elected for the ensuing year as follows: C. C. Beall of Morgantown, president;

I. M. Maxwell of Lost Creek, vice-president; and J. H. Rietz of Morgantown, secretary-treasurer.

J. H. RIETZ,
Secretary.

COMING MEETINGS

New York City, Veterinary Medical Association of. Hotel New Yorker, New York, N. Y., November 1, 1939.

Dallas-Fort Worth Veterinary Medical Society. Fort Worth, Texas. November 2, 1939. H. V. Cardona, secretary, 2736 Purington Ave., Fort Worth, Texas.

Houston Veterinary Association. Houston, Texas. November 2, 1939. W. T. Hufnall, secretary, 1612-14 E. Alabama Ave., Houston, Texas.

Midwest Small Animal Association. Hotel Burlington, Burlington, Iowa. November 2, 1939. C. L. McGinnis, secretary, 3000 N. University, Peoria, Ill.

Small Animal Hospital Association. Los Angeles, Calif., November 7, 1939. R. W. Gerry, secretary, 8474 Melrose Ave., Los Angeles, Calif.

Southeastern Michigan Veterinary Medical Association. Medical Arts Bldg., 3919 John R St., Detroit, Mich. November 8, 1939. F. D. Egan, secretary, 17422 Woodward Ave., Detroit, Mich.

St. Louis District Veterinary Medical Association. Melbourne Hotel, St. Louis, Mo. November 8, 1939. J. P. Torrey, secretary, 610 Veronica Ave, East St. Louis, Ill.

Willamette Valley Veterinary Medical Association. Albany, Ore. November 8, 1939. T. Robert Phelps, secretary, 1514 Washington St., Oregon City, Ore.

Southern Veterinary Medical Association. Columbia, S. C. November 9-11, 1939. L. A. Mosher, secretary, Box 1533, Atlanta, Ga.

Chicago Veterinary Medical Association. Hotel Sherman, Chicago, Ill. November 14, 1939. W. A. Young, secretary, 157 W. Grand Ave., Chicago, Ill.

Southern California Veterinary Medical Association. Chamber of Commerce Bldg., Los Angeles, Calif. November 15, 1939. Charles Eastman, secretary, 725 S. Vancouver Ave., Los Angeles, Calif.

Mississippi Valley Veterinary Medical Association. Hotel Custer, Galesburg, Ill. November 15-16, 1939. L. A. Gray, secretary, Bushnell, Ill.

Kansas City Veterinary Medical Association. Kansas City, Mo. November 20, 1939. S. J. Schilling, secretary, Box 167, Kansas City, Mo.

San Diego County Veterinary Medical Association. Zoological Research Bldg., Balboa Park, San Diego, Calif. November 20, 1939. Paul DeLay, secretary, State Poultry Pathological Laboratory, Balboa Park, San Diego, Calif.

Massachusetts Veterinary Association. Hotel Westminster, Copley Square, Boston, Mass. November 22, 1939. H. W. Jakeman, secretary, 44 Bromfield St., Boston, Mass.

United States Live Stock Sanitary Association. Morrison Hotel, Chicago, Ill. December 6-8, 1939. L. A. Merrill, secretary, 221 N. La Salle St., Chicago, Ill.

Minnesota State Veterinary Medical Society. Hotel Radisson, Minneapolis, Minn. January 8-9, 1939. H. C. H. Kernkamp, secretary, University of Minnesota, St. Paul, Minn.

Illinois State Veterinary Medical Association. Leland Hotel, Springfield, Ill. February 15-16, 1940. C. C. Hastings, secretary, Williams-ville, Ill.

PERSONAL NOTES

Births

To Dr. (U. of P. '30) and Mrs. L. R. Barto of Basking Ridge, N. J. a daughter, Elaine Miller, September 18, 1939.

To Dr. (O. S. U. '29) and Mrs. E. K. LeDune of Sullivan, Ind. a daughter, Pamela Joyce, October 3, 1939.

To Dr. (O. S. U. '32) and Mrs. James R. Collier of Indianapolis, Ind., a son, John Robert, October 4, 1939.

To Dr. (U. of P. '28) and Mrs. Taylor P. Rowe of Richmond, Va., a daughter, Ann Gayle, September 19, 1939.

To Dr. (Iowa '21) and Mrs. A. L. Birch of Worthington, Minn., a daughter, October 5, 1939.

Marriage

Wm. Robert Kornis (U. of P. '39) of Somerset, Pa., to Frieda L. Weyland, September 15, 1939.

Activities

Clifford Westerfield (Mich. '38), formerly with the federal bureau of animal industry at Oklahoma City, Okla., has replaced Leonard J. Goss (O. S. U. '34) as assistant veterinarian in the department of animal pathology, University of Kentucky, Lexington, Ky.

W. C. Sprinkle (T. H. '11) of Terre Haute, Ind., has opened a new dog and cat hospital.

D. F. Eveleth (Iowa '34) has joined the staff of the University of Arkansas, Fayetteville, Ark., as head of the department of bacteriology and veterinary science.

W. F. Gross (N. Y.-Amer. '05) was retired recently after having served for 23 years in the Canal Zone. He has returned to the States and now resides in Denver, Colo.

Joseph W. Harrison (Colo. '35) of Coquille, Ore., has sold his practice to Oliver P. Heller (Ohio '39) and has purchased the practice of J. L. Masson (San. Fran. '14) of Eureka, Calif.

W. W. Dimock (Corn. '05) of the University of Kentucky, Lexington, Ky., has recovered from an attack of laryngitis which confined him to his home during the first two weeks of October.

George E. Martin (K. S. C. '24) of Woodbury, N. J., supervising veterinarian for the Bureau of Animal Industry, U. S. Department of Agriculture, resigned on August 15 to accept a position in the Veterinary Hospital, Houston, Texas.

H. H. Green (Wash. '19), formerly assistant state veterinarian, has accepted an appointment on the city meat-inspection force at Portland, Ore. Rod C. McCornack (Wash. '34) of the California state veterinarian's force has accepted the position formerly held by Dr. Green.

I. M. Jackson (Colo. '38) has resigned his position as junior veterinarian with the federal bureau of animal industry to engage in practice at Boise, Idaho. He has purchased the small animal hospital formerly operated by the late J. D. Adams.

M. W. Emmel (Iowa '19) was recently appointed as examiner in pathology to the newly created Florida State Board of Examiners in the Basic Sciences by Governor Fred P. Cone. The board will examine applicants for proficiency in the basic sciences as a prerequisite to eligibility for examination for license to practice the healing art as applied to human disease.

J. M. Arburua (San Fran. '15) of San Francisco, Calif., reported the death of his wife and injuries to himself as the result of an automobile accident on June 25. On a slippery highway near Kalispell, Mont., following a vacation tour of Glacier National Park, the car skidded from the road and turned over twice. Mrs. Arburua suffered a dislocation of the sixth cervical vertebra and died the following day. The three Arburua children escaped injury.

C. C. Morrill (Mich. '33) resigned his position as associate professor of veterinary pathology at Kansas State College, effective September 1, having been appointed associate animal pathologist in the division of animal industry, Illinois Department of Agriculture. He has been assigned to the laboratory of animal pathology

and hygiene, University of Illinois, and will also serve as associate in animal pathology and hygiene in the agricultural experiment station at Urbana, Ill.

DEATHS

Fintan O. Killian of St. Louis, Mo., died on June 15, 1939, at the age of 45. The cause of death was coronary block.

Born on January 20, 1894, at Perryville, Mo., Dr. Killian was graduated from the Kansas State College in 1921. Immediately after graduation and up to the time of his death, he conducted a small animal hospital in St. Louis.

Dr. Killian joined the A.V.M.A. in 1924.

Frank T. McMahon of Chicago, Ill., died at the age of 77 on October 18, 1939.

One of the oldest practicing veterinarians in Illinois, Dr. McMahon served for 48 years as chief veterinarian for the Chicago police mounted division.

Conrad John Johannes died at his home in Saskatoon, Saskatchewan, on September 4, 1939, at the age of 64.

A graduate of the Ontario Veterinary College, class of 1905, Dr. Johannes was employed at the time of his death as a veterinary surgeon in the health of animals branch of the Dominion department of agriculture. He joined the A.V. M. A. in 1916.

Melancthon Hamilton of Oneonta, N. Y., died on August 16, 1939, following a long illness.

A graduate of Cornell University, class of 1905, Dr. Hamilton joined the national association in 1913.

I. P. Gilbert of Courtland, Va., died of a brain tumor on August 11, 1939, at the age of 39.

Born at Stuart, Va., on May 6, 1900, Dr. Gilbert was graduated from the United States College of Veterinary Surgeons in 1922. He joined the national association in 1929.

G. W. Loveland of Torrington, Conn., died at the age of 76 on September 18, 1939.

A graduate of the Chicago Veterinary College, class of 1894, Dr. Loveland was the first and only milk inspector for the Borough of Torrington. He retired from active practice about ten years ago, and had been ill for the past 2½ years. He joined the national association in 1899.

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